

PHYSICAL ACTIVITY, SPORT AND YOUTH – KNOWING AND ACTING

KINO-QUÉBEC SCIENTIFIC COMMITTEE POSITION STATEMENT

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Kino-Québec Scientific Committee consists of a group of Québec experts from the scientific, medical and professional fields of physical activity and health, who advise Kino-Québec authorities and issue position statements on issues related to physical activity.

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HIGHLIGHTS

Below are highlights of the literature review and analysis carried out by the Kino-Québec Scientific Committee.

1. In Québec like elsewhere, young people's physical fitness has deteriorated over the last few decades. In fact, it has deteriorated to such an extent that a growing number of Quebeckers are at risk of developing cardiovascular disease, a health problem that affects a large part of the adult population.
2. Juvenile obesity is a major public health problem given its prevalence and the fact that juvenile obesity is linked to increased risk of adult obesity and cardiovascular disease, especially among those who are sedentary.
3. For both youth and adults, sports and physical activities that stimulate the cardiorespiratory system are the cornerstone of an effective weight-control strategy and also improve blood lipid and blood sugar profiles.
4. Weight-bearing locomotor activities, impact sports and jumping exercises, as well as strength training increase bone mineral density and bone strength. In fact, more than at any other time in life, the greatest gains in bone mass, a determining factor of future bone health, occur before and during puberty.
5. More and more studies are showing that sport and physical activity in childhood and adolescence has beneficial effects on several determinants of psychological well-being and mental health, such as mood, self-image and self-esteem, and reduces signs and symptoms of stress, depression and anxiety.
6. Physical activity and sports provide opportunities for young people to develop friendships. Under favourable conditions, they may help youth integrate socially while giving them opportunities to develop their social and interpersonal skills.
7. The relationship between sport or physical activity, the development of social skills and a healthy lifestyle is not as well documented or convincing as that between physical activity and its benefits on physical fitness and health, nor has a causality relationship been proved. However, even if the differences between active and inactive youth are not always obvious, this relationship should be emphasized in order to promote sports and physical activities that focus on the development of personal qualities.
8. Increasing the amount of time devoted to physical education either improves or

has no detrimental effect on academic performance, even if less time is spent on other school subjects.

9. A moderate yet significant link between physical exercise and better academic performance has been shown through factors such as self-esteem, self-control, social skills, a feeling of belonging to the school and better classroom behaviour. This link could be explained by better cognitive functioning and a relaxed state that promotes learning.
10. Studies show that participation in sports and physical activities in secondary school may be linked to greater student retention. While there may not be a cause-effect relationship, participation in extracurricular sports activities fosters a feeling of belonging to the school, a factor of student retention.
11. It appears that most of the health benefits of physical exercise in childhood and adolescence disappear if participants stop exercising. The effects on body composition, bone health and reduced risk of breast cancer persist into adulthood, but to a lesser degree.
12. It is important that children do a variety of physical exercises as early as possible in childhood, so that they can develop basic motor skills that will make it easier and more enjoyable for them to engage in sports and physical activities.
13. If sports and physical activities are to have the expected beneficial effects, they must be carried out with proper support and under suitable conditions. Parents and all those supervising these activities, particularly coaches, can encourage young people to excel and persevere, without putting too much pressure on them. In addition to sports performance goals, goals related to personal development and a healthy lifestyle should also be emphasized.
14. If youth are to continue to engage in sports in adolescence, activities should be fun and avoid early specialization, if possible.
15. The guidelines issued to date concerning the amount of physical activity children and adolescents should engage in, and especially our interpretation of these guidelines, overlook a number of facts, particularly the following:
 - a. Sport and physical activity benefit more than just physical health.
 - b. There is really no physical activity threshold that can be considered "sufficient."
 - c. Each type of physical activity provides specific health benefits, but none

combines all the benefits of all sports and physical activities, and therefore cannot replace them.

16. Children and adolescents should engage in as many physical activities as possible every day. Activities should be fun and, as much as possible, include exercises that promote and maintain physical fitness and strengthen bones.
17. Intermittent activity, like prolonged continuous activity (which children tend to dislike), can also improve cardiorespiratory fitness.
18. Limiting time spent in sedentary activities can help reduce weight and obesity problems, but may not necessarily increase participation in sport and physical activity.
19. Participation in physical activity depends not only on individual factors, but also on environmental, social, cultural, physical, political and economic factors. Applying strategies that take into account each of these elements can increase participation in physical activity.
20. Peer approval has a strong impact on young people's intention to be active and their level of physical activity.

In addition to being fun, sports and physical activities have beneficial effects on physical fitness, physical and mental health and academic achievement. These activities are also associated with student retention and key factors related to well-being and quality of life, notably social and interpersonal skills.

Promoting sports and physical activities among Québec children and adolescents requires the commitment of a number of stakeholders: parents, health and education professionals, youth physical activity leaders, elected representatives, opinion leaders, etc.

INTRODUCTION

Physical activity is vital to good health.⁶² In fact, the literature clearly indicates that *adults* who participate in regular and continuous physical activity:^{66, 154, 172, 240, 326}

- **improve and maintain their physical fitness (e.g. cardiorespiratory fitness, endurance, muscular strength, flexibility) and therefore their**

functional ability

- **decrease their risk of and premature death from cardiovascular disease (including hypertension and stroke), type 2 diabetes, dyslipidemia, osteoporosis, breast cancer, colon cancer and, to a lesser extent, lung cancer and endometriosis**
- **are able to more easily maintain a normal weight, lose weight if they need to, and maintain a healthy weight after weight loss, if they combine physical activity with a proper diet**
- **reduce stress and symptoms of depression**
- **preserve cognitive function**

Although young people also reap the benefits of regular, continuous physical activity, too many of them do not do get enough exercise.

Encadré

Youth

In this position statement, the term youth includes children and adolescents in elementary school and secondary school. Certain parts of this document may also apply to preschool children and young adults.

Fin de l'encadré

In Québec, in 2004, more than one in four boys (26.5%) and nearly one in two girls (49.2%) aged 6 to 11 accumulated less than seven hours of moderate or vigorous physical activity during their leisure time.²²⁶ The situation is worse among 12- to 17-year-olds. In 2007-2008, close to one in two boys (47.5%) and nearly two in three girls (64.7%) did not exceed this threshold.¹⁵⁵ A sharp decrease in physical activity during leisure time has been noted in the period between childhood and adolescence. Québec studies indicate that this decrease occurs in both sports and non-sports activities.¹⁸⁵

While Québec boys aged 6 to 17 engage in a level of physical activity that is comparable to that of boys in the rest of Canada, Québec girls exercise less than most Canadian girls of the same age.²²⁶

Encadré

Sport and physical activity

In this document, the expression “sport and physical activity” designates any form of movement that results in energy expenditure: organized and non-organized

sports, games, recreational activities, active transportation, physical education classes, activities of daily living, etc. The term “sport” refers to introductory sports activities as well as recreational and competitive activities that may or may not be overseen by recognized organizations (see Appendix I).

Fin de l’encadré

Since the publication, in 2000, of *L’activité physique, déterminant de la santé des jeunes*,⁶³ new research findings have shed light on the effects of regular sport and physical activity on the current and future fitness and health of children and adolescents. This document takes stock of this issue and examines the beneficial effects that frequent and continuous physical activity can have on mental health. It also looks at potential links between sports and physical activities and well-being, social relationships, social skills, healthy lifestyle habits, academic success and student retention. We will also make new recommendations about the level and type of sports and physical activities that children and adolescents should engage in.

This document also presents factors to be taken into account when designing, justifying and implementing small- or large-scale programs or strategies aimed at encouraging youth to increase their current and future level of participation in sports and physical activities.

Parents, health and education professionals, youth physical activity leaders, elected representatives, opinion leaders and others concerned will find in this position statement information supported by reliable data, as well as arguments and methods to promote and facilitate frequent and continuous participation in sports and physical activities. The challenge is to help children and adolescents discover the pleasure of regular physical activity. This is not only a public health goal, but also a major social issue.

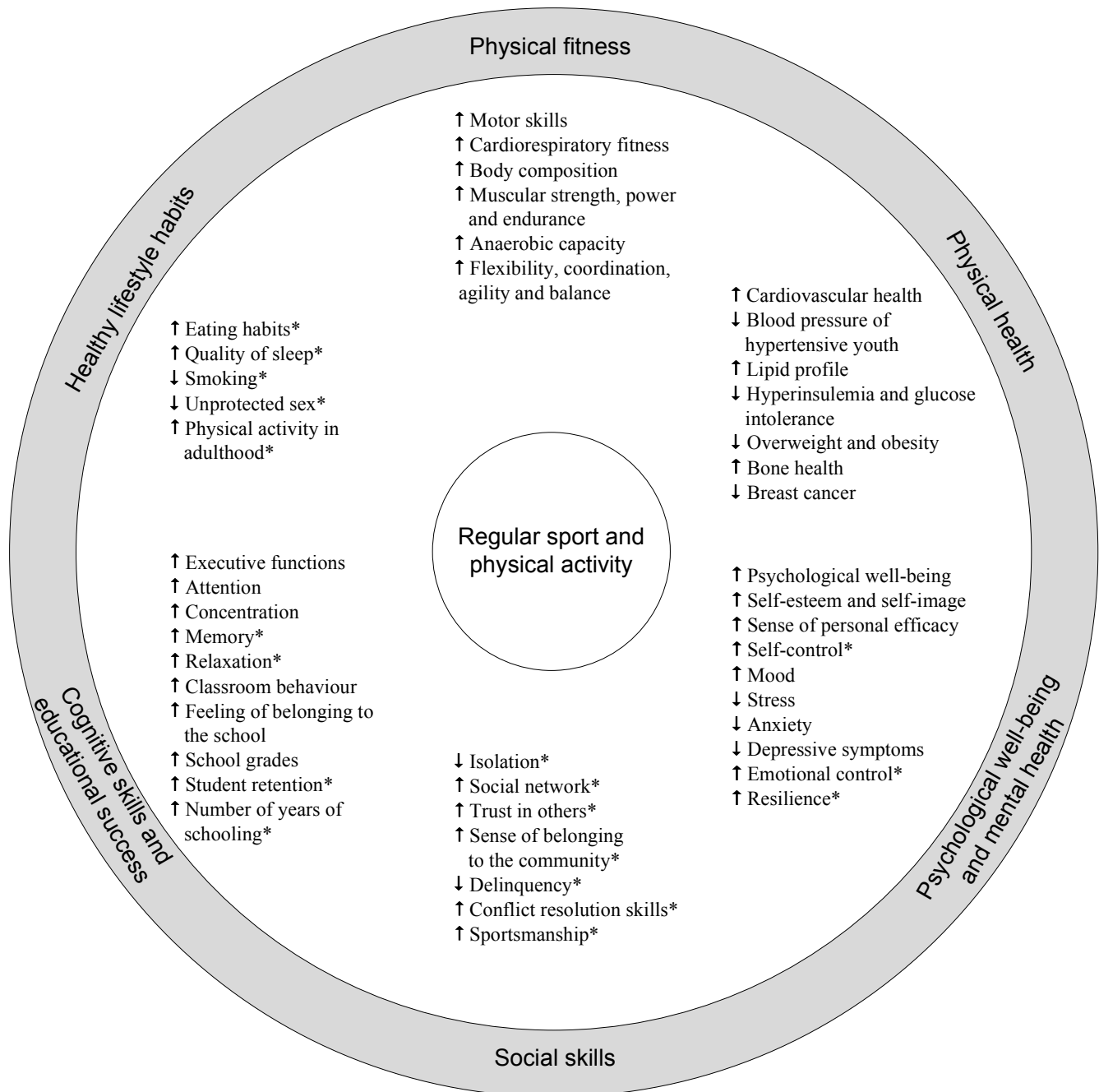
1. RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND WELL-BEING

The obesity pandemic, often associated with sedentary behaviour, is the main reason why parents, teachers and political and medical authorities are increasingly concerned by low levels of physical activity in young people.¹⁰⁰

In addition to being a form of recreation and a source of well-being, sports

and physical activities, when varied, improve and maintain every aspect of physical fitness. Essential to physical and mental health, frequent and continuous physical activity helps young people succeed in school, appears to encourage them to stay in school and can go hand in hand with other healthy lifestyle habits.

FIGURE 1 – ELEMENTS OF WELL-BEING ASSOCIATED WITH PARTICIPATION IN FREQUENT AND CONTINUOUS SPORTS AND PHYSICAL ACTIVITIES IN CHILDHOOD AND ADOLESCENCE



↑: increase or improvement, higher-level association

↓: decrease, lower-level association

*: According to scientific observations, youth who engage in sports and physical activities generally tend to benefit from doing so. For the time being, however, it cannot be concluded that this beneficial effect is the result of physical activity *per se*. It is possible that being active and having a sense of well-being stem from the same factor (e.g. parental support), without there being a cause-effect relationship.

1.1 PHYSICAL FITNESS

People who are physically fit have fewer difficulties with school- and work-related tasks as well as daily and recreational activities.

Physical fitness is a function of motor skills and physical qualities such as cardiorespiratory fitness,^a body fat percentage, muscular strength, power and endurance, anaerobic capacity, flexibility, coordination, agility and balance.

Motor skill proficiency is positively associated with the propensity to engage in physical activity now³⁵⁰ and in the future.^{24,195} Although it is not always possible to determine the extent to which motor skill proficiency fosters participation in physical activity or which physical activity enhances motor coordination, one thing is certain: children with coordination problems are more likely to be overweight.⁴⁸

According to the Canadian Health Measures Survey, young people had a higher body mass index, less grip strength and less flexibility in 2007, 2008 and 2009 than in 1981 (tables 1, 2 and 3).³¹⁵

Cardiorespiratory fitness

A meta-analysis of the results of 304 068 North Americans aged 6 to 19 suggests their VO_2 max increased between 1950 and 1970, but has since decreased by an average of 7.4% per decade.³¹² This decrease appears to be due to different social, behavioural, physical, psychosocial and physiological factors, including reduced energy expenditure.

The most significant determinants of cardiorespiratory fitness in children are their genetic makeup and weight. However, it has long been known that intense physical activity is associated with cardiorespiratory fitness, in both youth and adults.^{231,240} In fact, regular sport and physical activity at intensities higher than 80% of the maximum heart rate improves VO_2 max.²² It has been shown that cardiorespiratory fitness can be developed in physical education classes, provided these classes are adapted to the physical abilities of each student.³⁶

It should be noted, however, that children generally dislike prolonged physical activity with little variation in intensity (e.g. long-distance running) and that they tend to spontaneously engage in short bursts of intense physical activity interspersed

^a Cardiorespiratory, or aerobic, fitness is the ability of the cardiovascular and respiratory systems (heart, lungs, blood circulation, muscle cells, etc.) to carry and use oxygen for muscular effort. Cardiorespiratory fitness is assessed by measuring maximal oxygen uptake (VO_2 max).³⁰⁴

with periods of less intensity.¹⁷ An estimated 95% of their physical activities involve high-intensity activities lasting barely more than 15 seconds.^{17,21} Intermittent activities can just as effectively stimulate the cardiorespiratory system. This was one of the findings of a research study carried out in Bordeaux, France, where an improvement was noted in the maximal oxygen uptake of children who spent one hour per week doing interval training at running speeds between 85% and 120% of maximum aerobic speed.^{b129} These results were corroborated by a review of recent literature, which also showed that young people's ability to recover after short periods of high-intensity exercise was greater than that of adults.²⁴⁹

Encadré

Physical activity intensity and cardiorespiratory improvement

A study measured the effect of eight months of moderate or vigorous training on the cardiorespiratory fitness and body composition of 80 obese adolescents aged 13 to 16.¹³⁵ These young people were randomly assigned to three groups:

- Group 1 attended twice-weekly lifestyle education sessions.
- Group 2 participated five times a week in moderate-intensity physical training sessions (55 to 60% of $VO_2\text{max}$).
- Group 3 participated five times a week in high-intensity physical training sessions (75 to 80% of $VO_2\text{max}$).

Groups 2 and 3 expended the same amount of energy (250 kcal) per session. Moderate training proved to be as beneficial in improving body composition and reducing visceral adiposity as high-intensity training. However, only those who participated in high-intensity training (Group 3) improved their cardiorespiratory fitness.

Fin de l'encadré

Body composition

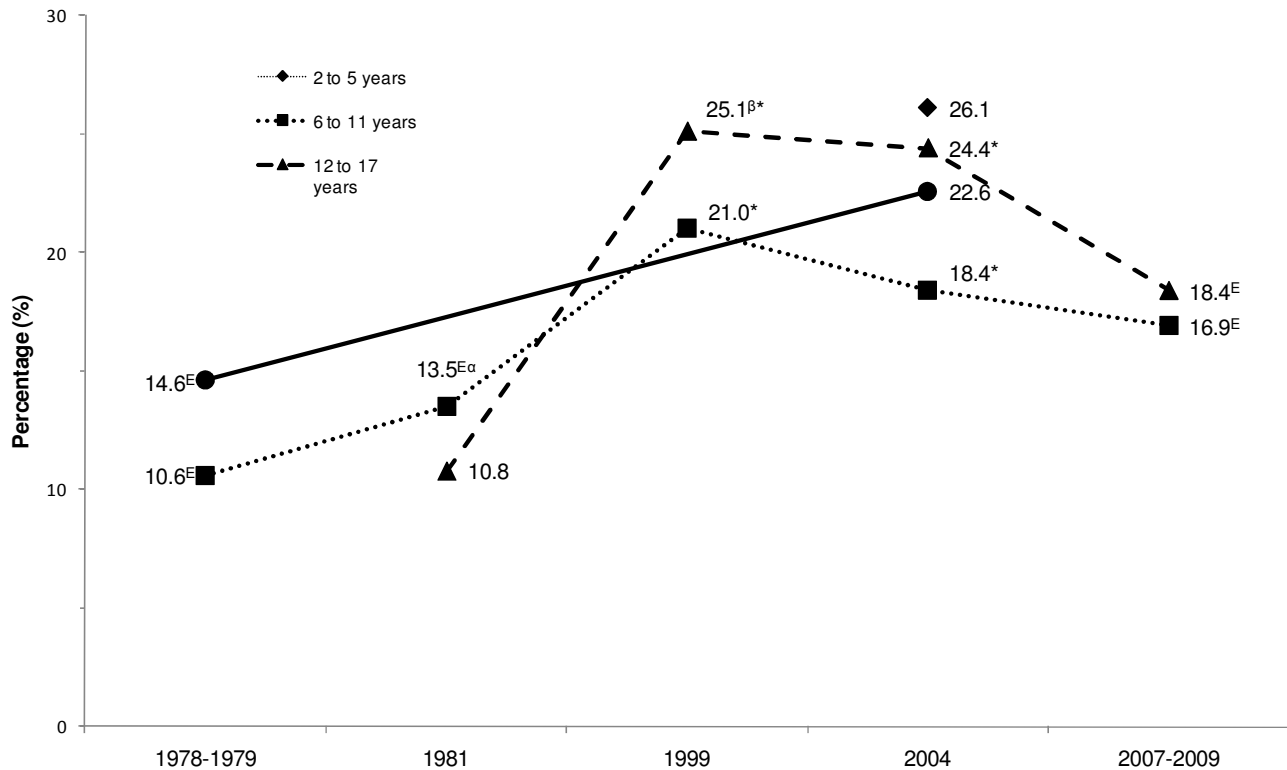
Body composition, or more specifically body fat percentage, is a key component of physical fitness. In recent years, juvenile obesity has become a major public health problem (Figure 2)²³² and is the main chronic condition encountered in pediatrics.²¹⁸

In Québec over a 25-year period, the percentage of overweight boys and girls between the ages of 2 and 17 rose from 14.6% in 1978-1979 to 22.6% in 2004.¹⁸⁰ The prevalence of overweight and obesity increased substantially between 1981

^b Maximal aerobic speed is the speed corresponding to the maximal oxygen uptake ($VO_2\text{max}$) achieved during a progressive and maximal test (e.g. cycling, running, skating).³⁰⁴

and 1999, both among children (13.5% to 21.0%) and adolescents (10.8% to 25.1%).¹⁸⁰

FIGURE 2 – PERCENTAGE OF OVERWEIGHT OR OBESE YOUTH AGED 2 TO 17 IN QUÉBEC, BETWEEN 1978-1979 AND 2007-2009



^E: Use with caution (data with a coefficient of variation (CV) from 16.6% to 33.3%)

^α: Data for 7- to 11-year-olds

^β: Data for 12- to 16-year-olds

^{*}: Significantly different from 1978-1979 or 1981 estimate, as applicable

Notes:

- The 1978-1979 data for 2- to 5-year-olds and 12- to 17-year-olds are too unreliable to be published.
- Height and weight were measured by research staff and were not reported by the subjects.

Sources: Lamontagne and Hamel (2009);¹⁸⁰ Statistics Canada (2010)²⁹⁰

Table 1 indicates that, in Canada, 12-year-old boys and girls typically weigh between 15% and 12% more than they did about thirty years ago. In fact, the average body mass index of boys rose from 18.1 to 19.2 kg/m², and that of girls from 18.4 to 19.5 kg/m². This is indicative of a proportionally larger increase in weight relative to height.

TABLE 1 – BODY COMPOSITION OF A TYPICAL 12-YEAR-OLD BOY AND GIRL, IN CANADA, IN 1981 AND IN 2007-2009

BOY

<u>1981</u>	BODY COMPOSITION	<u>2007-2009</u>
150.9 cm	Height	155.8 cm*
41.6 kg	Weight	48.0 kg*
18.1 kg/m ²	Body mass index	19.2 kg/m ^{2*}
64.9 cm	Waist circumference	66.2 cm
78.0 cm	Hip circumference	84.0 cm*
0.83	Waist-to-hip ratio	0.82*

GIRL

<u>1981</u>	BODY COMPOSITION	<u>2007-2009</u>
153.1 cm	Height	155.9 cm*
42.7 kg	Weight	47.6 kg*
18.4 kg/m ²	Body mass index	19.5 kg/m ^{2*}
62.4 cm	Waist circumference	68.0 cm*
81.2 cm	Hip circumference	86.0 cm*
0.76	Waist-to-hip ratio	0.79*

*: significantly different from 1981 estimate

Source: Tremblay et al. (2010)³¹⁵

The high incidence of overweight and obesity among youth is all the more worrisome since overweight children are twice as likely to remain so later on.²⁸² Since juvenile obesity is associated with a number of chronic diseases in adulthood (especially if combined with a sedentary lifestyle), it is important to prevent children from gaining excess weight as early as possible.²⁹⁴

As underscored in *L'activité physique, déterminant de la santé des jeunes*,⁶³ published in 2002, and in *L'activité physique et le poids corporel*,⁶⁴ published in 2006, excess weight is always the result of a positive energy balance. Physical exercise, the only method of increasing energy expenditure over which we have a certain amount of control, can therefore play an important role in weight control. It has been shown that three to seven 30- to 60-minute sessions of moderate physical exercise per week can reduce adiposity in overweight youth.^{240, 295} However, an increase in the level of physical activity does not automatically result in weight loss; a proper diet is still important.⁶⁴

It would appear that part of the protective effects of physical exercise during childhood and adolescence continue into adulthood.²⁰⁹ In fact, the National

Longitudinal Study of Adolescent Health, a study carried out in the United States with 3345 students in grades 8 through 12, revealed that the risk of being overweight in adulthood was inversely proportional to the amount of exercise carried out during physical education classes and extracurricular physical activities.²⁰⁹ Each weekday that adolescents spent in physical education decreased the odds by 5% of being an overweight adult five years after the initial measurement, with participation in all five weekdays of physical education decreasing the odds by 28%.

As the Kino-Québec Scientific Committee has already pointed out,^{63, 64} there is no doubt that increasing energy expenditure through physical activity should be the prime method of ensuring a negative energy balance. Reducing food intake as a strategy for achieving a negative energy balance may lead to nutritional deficiencies, which can be damaging during periods of growth.

Muscular strength

The Canadian Health Measures Survey revealed that the percentage of young Canadians aged 15 to 19 who did not achieve a certain minimum threshold of muscular strength (i.e. hand grip strength equal to or less than 89 kg for boys and 52 kg for girls) was higher in 2007-2009 than in 1981 (55% and 35% for boys, 45% and 19% for girls, respectively).³¹⁵ On average, the results of the strength evaluation test for 12-year-old boys and girls decreased by 10% and 7%, respectively, in less than 30 years (Table 2). Yet children and adolescents need only participate in two or three strength training sessions a week in order to significantly improve their muscular strength.^{32, 240, 295}

TABLE 2 – STRENGTH: PORTRAIT OF A TYPICAL 12-YEAR-OLD BOY AND GIRL, IN CANADA, IN 1981 AND IN 2007-2009

<u>1981</u>	BOY	<u>2007-2009</u>
49 kg	Grip strength	44 kg*

<u>1981</u>	GIRL	<u>2007-2009</u>
43 kg	Grip strength	40 kg*

*: significantly higher than the 1981 estimate

Source: Tremblay, et al, (2010)³¹⁵

Anaerobic capacity

The effects of sport and physical activity on other determinants of physical fitness are less well known. During growth, the development of anaerobic capacity is largely explained by changes in the blood concentration of anabolizing hormones and in body size. Unlike cardiorespiratory fitness, young people's anaerobic capacity has not decreased over the last 50 years. These were the findings of a meta-analytical review of the results of 28 320 308 youth aged 6 to 19 from 27 countries. In fact, the power (vertical and horizontal jump tests) and running speed (sprint and relay race tests) increased by 0.3% and 0.4%, respectively, for each decade.³¹¹

Flexibility and balance

As indicated in Table 3, in Canada, 12-year-old boys and girls were less flexible in 2007, 2008 and 2009 than in 1981. There is no consensus as to the importance of flexibility for young people's well-being and health. However, there is no doubt that regularly doing stretching exercises and sports or physical activities that require flexibility helps develop and maintain flexibility at any age.

TABLE 3 – FLEXIBILITY: PORTRAIT OF A TYPICAL 12-YEAR-OLD BOY AND GIRL, IN CANADA, IN 1981 AND IN 2007-2009

<u>1981</u>	BOY	<u>2007-2009</u>
26.5 cm	Result of sit-and-reach test	21.4 cm*

<u>1981</u>	GIRL	<u>2007-2009</u>
32.0 cm	Result of sit-and-reach test	28.2 cm*

*: significantly higher than the 1981 estimate

Source: Tremblay, et al. (2010)³¹⁵

A study carried out with former students in the Trois-Rivières and Pont-Rouge (Portneuf) region indicates that participating in an enriched physical education program in elementary school (5 hours rather than 40 minutes a week) is associated with a better balance test score in adulthood.³¹⁸

It is not known if young people's physical fitness has improved since new ways of promoting sports and physical activities have been developed (Appendix II) and since parents have become better informed about the problems that could affect sedentary or obese youth.

1.2 PHYSICAL HEALTH

The beneficial effects of frequent and continuous physical activity on children's and adolescents' health are less well known than those on adults' health, particularly since the health problems for which physical exercise could play a preventive and curative role affect young people less than adults. Health is not merely the absence of disease or disability, it is also a state of complete physical and mental well-being in which sport and physical activity can play a key role.²³⁰

The health of tomorrow's adults is strongly linked to current factors that encourage youth to adopt a physically active lifestyle and maintain it throughout adulthood. These factors include not only a desire to live a healthy life, but perhaps also personal physical fitness factors, especially motor skill proficiency. In fact, people who find sports and physical activities easy to do enjoy them more.

Consequently, in addition to asking ourselves what health problems sedentary youth are more likely to experience as adults, we must also examine how sports and physical activities should be organized in order to maximize young people's chances of integrating them into their lifestyle.

First, let us look at the findings of scientific studies on the effects of regular sport and physical activity among youth.

1.2.1 Cardiovascular and metabolic health

The effort to decrease sedentary behaviour is a key public health issue mainly because physical activity has a preventive effect on cardiovascular disease (CVD) in adults.^{62, 328} In fact, the likelihood of developing or of dying from a cardiovascular disease is approximately 80% higher for sedentary people than it is for the physically active.⁶²

Although it is mainly adults who are at risk for cardiovascular disease, the predictors of these health problems can be traced back to childhood and adolescence.²³¹ Over the past few years, more and more adolescents have been affected by metabolic syndrome or one of its components. While not a disease *per se*, this syndrome indicates the presence of physiological signs associated with an increased risk for early atherosclerosis, type 2 diabetes, heart disease and stroke. The signs include abdominal obesity as well as abnormally high blood pressure and blood glucose and lipid rates.

Encadré**Metabolic syndrome**

The incidence of metabolic syndrome among American adolescents aged 12 to 19 (National Health and Nutrition Examination Survey cohort) rose from 4.2% in 1988-1992 to 6.4% in 1999-2000⁹¹ and 8.6% in 2001-2006.¹⁶³ Metabolic syndrome was present in more than one third of obese youth, half of whom exhibited at least one of the related symptoms.

Fin de l'encadré

Research has shown that exercise improves metabolic health indicators in both obese and non-obese youth.¹⁶¹ While a higher level of physical activity is generally associated with better cardiovascular and metabolic health, it is not known whether there is a minimum threshold of physical activity that gives rise to these beneficial effects.²⁴⁰ There is no doubt, however, that engaging in sports and physical activities that stimulate the cardiorespiratory system improves the blood lipid and lipoprotein profiles of both youth and adults.^{107, 140, 211, 291, 295}

Let us take the example of a Chinese study in which 49 obese youth (12- to 14-year-old boys and girls) were randomly assigned to either a control group or an exercise group under professional supervision for nine months.⁵⁵ Training greatly improved such important health and physical fitness indicators as muscular strength, cardiovascular endurance and flexibility. However, as Table 4 indicates, three months after the end of training, practically all the beneficial effects had disappeared, which confirms that sustained physical activity is essential to maintaining these effects.

TABLE 4 – CHANGE IN METABOLIC HEALTH AND PHYSICAL FITNESS PARAMETERS FOR OBESE YOUTH, ACCORDING TO WHETHER OR NOT THEY PARTICIPATED IN A SUPERVISED EXERCISE PROGRAM

Parameter	Group	Start of exercise program	End of exercise program*	3 months after the end of exercise program*
Body mass index (kg/m ²)	Exercise	27.5	26.9*	28.2*
	Control	27.1	27.6*	27.8*
Triglycerides (mmol/L)	Exercise	1.3	0.9*	1.5
	Control	1.0	N/A	1.5*
High density	Exercise	1.3	1.3	1.6

lipoprotein (mmol/L)	Control	1.4	N/A	0.9*
Blood glucose (mmol/L)	Exercise	5.2	4.0*	5.4
	Control	4.6	N/A	5.1*
Insulin (mU/L)	Exercise	29.2	18.5*	39.7
	Control	37.6	N/A	43.8

*: Significantly different from the value at the start of the program

N/A: Information not available

Source: Chang, et al. (2008)⁵⁵

In reality, since the benefits of physical activity on cardiovascular health are reversible, they will continue into adulthood only with sustained exercise. This was one of the findings of a study carried out with former elementary school students in the Trois-Rivières region. Some of these students had taken an enriched physical education program (5 hours instead of 40 minutes per week) in elementary school and some had not. Twenty years later, except for the balance test score mentioned earlier, there was no significant difference between the experimental group and the control group with regard to physical fitness measures (cardiorespiratory fitness, grip strength, body composition) or metabolic health indicators (hyperlipidemia, triglycerides, hypertension, abdominal obesity).³¹⁸

Encadré

Lipid profile

Improvement in the blood lipid profile following intense aerobic training is more marked in adolescents deemed to be at risk, namely obese youth, diabetics and those with a family history of dyslipidemia.^{13, 136, 269}

Fin de l'encadré

Children with high blood pressure—more common among those who are obese—are more likely to become hypertensive adults.³³⁸ Obese and hypertensive adolescents can lower their blood pressure by exercising, especially if they lose weight.^{73,88,102,137,138,166,196} However, physical activity should be carried out frequently—almost every day—in order to see this health benefit.²⁹⁵

1.2.2 Bone health

As we underscored in 2008, in *Activité physique et santé osseuse*,⁶⁵ children and adolescents who do weight-bearing exercises achieve greater peak bone mass from which they will benefit for the rest of their lives. These exercises, which include weight-bearing locomotor activities, high-impact and/or jumping exercises and sports and weight lifting, help improve bone density and skeletal health, making

bones more resistant and therefore less likely to break in case of falls.

Although physical activity is beneficial at any age, it is particularly beneficial during adolescence and even more so before the onset of puberty, when gains in bone mass are greatest. In fact, the skeleton's ability to adapt to mechanical loads associated with physical exercise is much greater before puberty than after.^{225, 345} This finding is well documented. As one study involving 105 high-level female tennis players revealed, girls who began competing a few years before the onset of puberty had 19 to 27% more bone mineral density in the dominant arm than in the other arm. Girls who began competing a few years after the onset of puberty had differences in bone mineral content of 6 to 10%, while girls in the control group who had never played racquet sports had differences of 3 to 4%.¹⁶⁸

The capacity of bones to adapt to a mechanical stress is greatest at the beginning of an exercise session, but declines logarithmically thereafter. In fact, bone cells become desensitized when mechanical stimulation is applied over a long period without interruption.²⁵⁷ The important factor in strengthening bones is not so much the duration but the frequency of the physical activity.⁶⁵

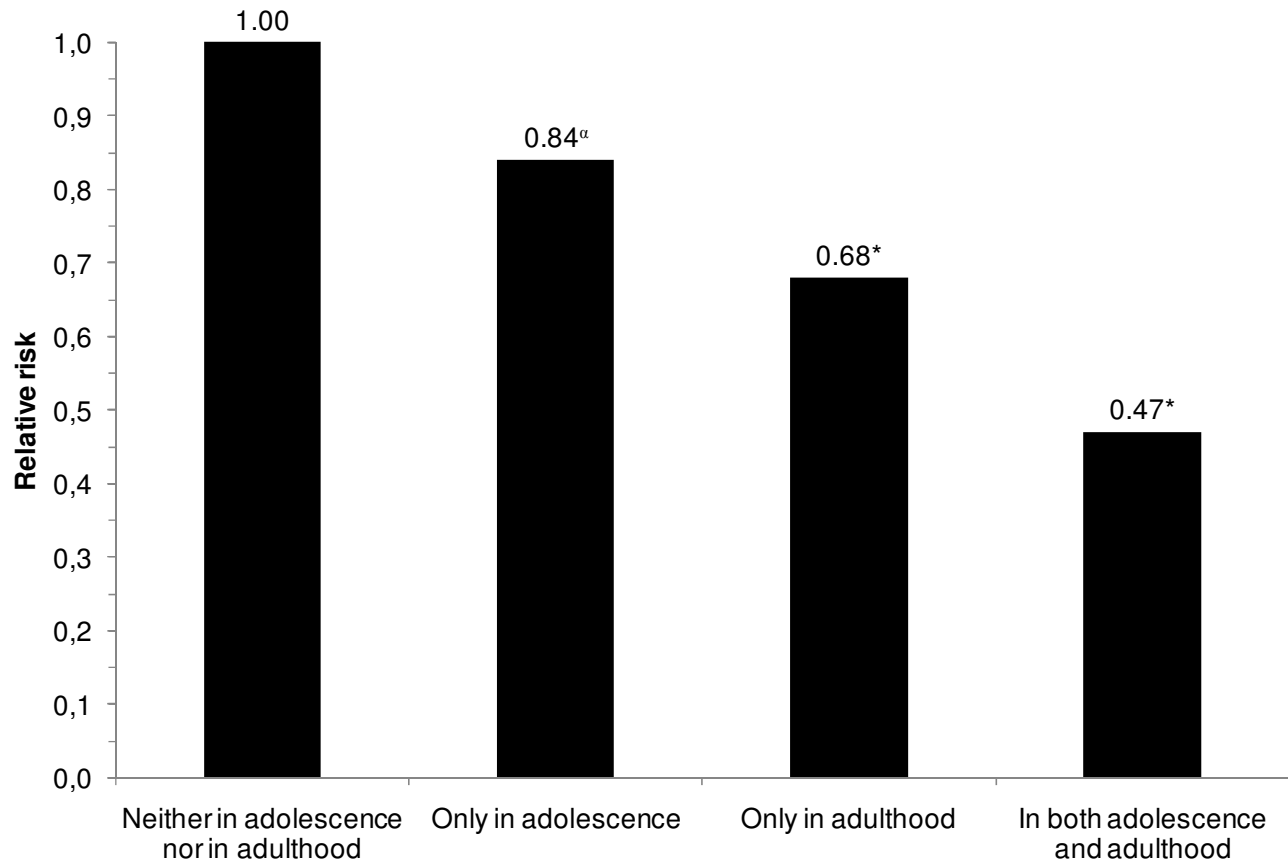
1.2.3 Cancer prevention

Breast cancer

A number of studies have revealed a link between recreational physical activity during adolescence and a reduced risk of breast cancer.^{116, 203, 278} A meta-analysis of 23 studies on physical activity in adolescent girls and young women aged 12 to 24 indicates that the risk of cancer is about 20% lower among those who are physically active.¹⁷⁹ On average, each hour of weekly physical activity during adolescence is associated with a 3% risk reduction in breast cancer.

According to a study involving 1459 women newly diagnosed with breast cancer and a control group of 1556 women, the link between physical activity in adolescence and a lower risk for breast cancer persists even if physical activity is discontinued in adulthood (Figure 3).²⁰³ Overall, women who had been active throughout their lives were less at risk for breast cancer.

FIGURE 3 – RELATIVE BREAST CANCER RISK AS A FUNCTION OF PHYSICAL ACTIVITY IN ADOLESCENCE, ADULTHOOD AND IN BOTH ADOLESCENCE AND ADULTHOOD



^a Since the confidence interval is between 0.70 and 1.00, the relative risk is almost significantly different from the reference value (1.00).

* Significantly different from the reference value (1.00)

Note: Relative risk was established by taking into account other relevant factors including age, education, household income, family history of breast cancer, history of adenofibroma, age at menarche, age at first live birth and age at menopause.

Source: Mathews, et al. (2001)²⁰³

Lung cancer

In adults, physical exercise decreases the risk for lung cancer.²⁴⁰ Although exercise alone is not sufficient to help people stop smoking, moderate or vigorous physical exercise over the short or long term can attenuate tobacco withdrawal symptoms and cravings.³³¹ It may also, but not necessarily, reduce the weight gain that often occurs when people stop smoking.^{170, 241}

Other cancers

Epidemiological research involving larger cohorts will perhaps reveal that a physically active childhood and adolescence also has a preventive effect on lower incidence cancers. This would appear to be the case upon examination of the physiological mechanisms that are related to exercise and that can reduce the risks for cancer.^{58, 72, 206}

Cancer treatment

Lastly, the beneficial effects of physical activity during treatment cannot be overlooked.¹⁷⁷ These include shorter hospital stays; decreased fatigue, anxiety and depression among young patients; stimulation of appetite, which can prevent weakening and loss of muscle mass; and stimulation of the immune and endocrine systems.

Encadré

Sport and injuries

The findings of a dozen or so studies²⁴⁰ indicate that, although sport and physical activity may be associated with a risk of injury,^{161,295} the long-term beneficial effects far outweigh this inconvenience. Note that already in 2001, in Canada, health care costs related to a sedentary lifestyle were estimated at \$5.3 billion (\$1.6 billion in direct costs and \$3.7 billion in indirect costs), or 2.6% of the total health care bill. In 1995, nearly 21 000 premature deaths were attributed to a sedentary lifestyle.¹⁶⁹

Fin de l'encadré

1.3 PSYCHOLOGICAL WELL-BEING AND MENTAL HEALTH

During childhood and adolescence, physical activity has beneficial effects on several mental health determinants. These effects are quickly felt, yet they are less significant than those on physical health.¹⁶¹ The mechanisms behind health benefits are starting to be understood.¹⁶ However, for the time being, it is not known whether they persist into adulthood if sport and physical activity is discontinued.

1.3.1 Anxiety and depression

In both youth and adults, physical activity improves mood^{12,231,348} and reduces

stress,²²⁷ anxiety^{182,231,295} and depression.^{182,231,295} According to cross-sectional studies and quasi-experimental studies,^c although this effect is somewhat weak, it is nonetheless significant.²⁹⁵

In one American study, 50 boys and girls aged 9 to 12 saw an improvement in their mood after attending a 12-week after-school physical activity program (that included aerobic activities, strength training, flexibility and motor skills) three days a week. No change was noted in the control group.¹²

Also in the United States, a two-year longitudinal study involving 4594 grade 7 students revealed that those who increased their physical activity outside of school saw a reduction in their depressive symptoms.²¹⁷ Although slight, the differences between active and inactive girls and boys were constant across all age groups.⁸¹ These results are all the more important since 15% of preschoolers in Québec already suffer from anxiety and depression.⁶⁹

1.3.2 Self-image and self-esteem

Self-image refers to the perception a person may have of his or her own physical appearance, whereas self-esteem refers to the value a person places on him or herself. Participation in physical activity fosters a positive self-image on both a physical level (e.g. skills, strength, endurance, appearance) and a more general level.^{139, 295}

Small- and medium-scale studies have proved the beneficial effects of physical activity on self-esteem.^{12, 42, 99, 236, 295} For example, an assessment of the American program *Girls on the Run*^d showed a significant increase in the self-esteem of 322 participants aged 8 to 12.⁸² However, more wide-ranging studies with tighter controls will be needed to better identify how physical exercise improves self-esteem.⁹⁸

It should be noted, however, that participating in sports and physical activities does not automatically produce this beneficial effect. In some cases, parents and adult activity leaders who are too demanding, who focus only on what young people do wrong without praising their achievements or who make disparaging remarks may have a negative influence on young people's self-image.^{95, 112, 113}

^c Research studies in which the subjects are not randomly assigned to groups, or some of whose key variables are beyond the control of research teams. The resulting inferences may nonetheless be valid.

^d Program consisting of twice weekly 60-minute sessions of physical activity; see www.girlsontherun.org.

1.4 COGNITIVE FUNCTION, EDUCATIONAL SUCCESS AND STUDENT RETENTION

Over the past few years, more and more research studies have highlighted a relationship between physical exercise, cognitive function, academic achievement and student retention.

1.4.1 Cognitive function

The short-term effects of physical exercise

Several recent studies indicate that the positive effects of physical exercise on academic achievement stem from improved cognitive functions.^{53,147} A study involving boys aged 9 and 10 showed that electro-cortical activity, measured using electromagnetic tomography, was altered shortly after physical exercise.²⁷³ More specifically, an overall state of relaxation conducive to learning was observed. Another study, carried out with preadolescent children, likewise revealed that executive cognitive functioning^e improves after physical exercise.¹⁴⁶

A 2003 literature review showed that there was insufficient data to conclude that physical exercise improves memory.²⁷⁹ However, recent research showed that children aged 11 and 12 had higher recall scores after participating in team games.²³⁹

The long-term effects of physical exercise on cognitive function

The benefits of exercise are not just temporary, since the long-term effects of frequent and continuous participation in sport and physical activity reinforce the short-term cognitive effects. Studies indicate that cardiorespiratory fitness is associated with improved information processing,^{145,296} and with stronger academic performance in mathematics^{53,101} and reading.⁵³ However, in several of the cross-sectional studies involved, researchers could not control all the factors that might influence academic performance or cognitive functioning. Moreover, no cause-effect relationship could be established through correlational analysis.

However, one study suggested that there could be a cause-effect relationship. Researchers examined the effect of a 13-week physical activity program (involving

^e Executive functions refer to a collection of complex brain processes that enable individuals to effectively direct their behaviour in order to adapt to new situations.^{189,210} These functions include the ability to inhibit inappropriate behaviours, to plan, to exercise judgment, to make decisions and to adjust strategies.²¹⁰

tag games, skipping, basketball and soccer) on a number of cognitive function indicators in 163 healthy but overweight children aged 7 to 11.⁷⁶ The subjects were randomly assigned to a control group (not engaged in physical activity) and a group that participated in the program. The researchers found that the children who exercised improved their executive functions (action planning mechanism) and their scores on a standardized mathematics test. They were also able to positively correlate improved executive functions with stronger academic performance in mathematics; the correlation was weak ($r = 0.24$), but significant. Lastly, a subgroup of children underwent a functional magnetic resonance imaging test during an inhibitory control task.^f The results showed increased activity in the prefrontal cortex, the area that controls executive functions, which enable children to plan their actions rather than act on impulse.⁷⁶

Encadré

Young people with attention deficit hyperactivity disorder often experience learning problems and motor deficiencies, and are often in poor physical condition.¹⁴¹ While this disorder affects boys more on a behavioural level, girls are affected more on a cognitive level.¹²⁰ Research has shown that physical exercise can attenuate certain problems related to this disorder.^{207, 214}

Fin de l'encadré

Mechanisms involved in the effects of exercise on cognition

Two nonexclusive mechanisms could explain the effects of physical exercise on the brain.⁷⁶

- **Psychosocial mechanism:** In addition to developing cognitive abilities specific to sports (e.g. carrying out a sequence of complex movements, memorizing rules, making quick decisions), sports and physical activities seem to affect self-image, self-control and self-efficacy.⁹⁷⁶ Indirectly, reinforcing these components would appear to improve certain cognitive functions.^{44, 76, 313}
- **Biological mechanism:** According to neuroimaging studies, fitness training seems to increase cortical neuron activity and improve the functioning of the central nervous system.^{76,147} Moreover, according to

^f An inhibitory control task serves to evaluate people's capacity to control their behaviour when there is conflict in their environment.

⁹ A sense of personal efficacy refers to the ability we feel we have to act in a certain way (e.g. carrying out certain physical activities), but also to overcome difficulties and obstacles involved in adopting and sustaining a particular behaviour.

non-human animal studies, increased levels of neurotrophic and growth factors in the brain could play a key role in the way physical activity affects cognitive function.¹⁴⁷

Encadré

According to an American study involving 243 elementary school students, physical exercise improves classroom behaviour. After only ten minutes of classroom-based physical exercise, students were better able to concentrate, exhibited fewer disruptive behaviours and were better able to stay on task.¹⁹⁸

Fin de l'encadré

1.4.2 Educational success and student retention

Recent reviews of the literature by Trudeau and Shephard indicate that physical activity is associated with better academic performance.^{321,322} Although a cause-effect relationship might be established, it is somewhat weak. There is no doubt that increasing the amount of time devoted to physical education either improves or has no detrimental effect on academic performance, even if this involves reducing the number of hours spent on other school subjects.^{4,54,321,322} Conversely, decreasing the number of hours of physical education in order to increase the number of hours of classroom instruction is not associated with improved academic performance and may even harm young people's health.^{183, 321}

It also appears that sports team participation is associated with greater academic achievement. A recent American study of 4746 high school students revealed that, regardless of their level of physical activity, those who belonged to at least one sports team had better grades.¹¹⁰ It is not known whether this finding can also apply to Québec, where school sports do not have the same significance and do not play the same role as they do in the United States.

One might argue that sports participation and academic performance go hand in hand because boys and girls with better marks are often more encouraged to play sports than other students. Conversely, some students may stop playing sports if school becomes more demanding or if they place greater value on good grades.^{8,71} Whether or not they have better marks, students who play school sports tend to view school as more important, precisely because they play sports.^{43, 97, 190}

In general, cross-sectional, quasi-experimental and experimental studies suggest that playing sports can have positive effects on academic success.^{321, 322}

Encadré**More physical education = better marks in elementary school**

A study of 546 elementary school students in the Trois-Rivières area showed that students in grades 2, 3, 5 and 6 who took part in one hour of physical activity per day under the supervision of a specialized physical education teacher had better academic results than students in the regular program (i.e. one 40-minute period per week supervised by the homeroom teacher with no special training in physical education).²⁷⁶ Studies conducted in California²⁶⁵ and Australia⁹⁶ came to the same conclusion.

Fin de l'encadré*Student retention*

Sport and physical activity participation is also associated with staying in school. Two American studies involving large samples showed that students who played high school sports were less inclined to drop out of school.^{205,351} According to another American study, 39% of grade 10 students who had belonged to at least one sports team graduated from college compared with 30% of students who had not played any sport.²³ Athletes stayed in school longer than non-athletes (i.e. 15.3 years compared with 14.6 years).

These observations are significant in light of the fact that 21% of young people in Québec drop out of school before the age of 20.¹³² Of course, these observations do not automatically lead to the conclusion that simply because they are physically active, young people may stay in school, since self-selection bias cannot be ruled out. However, as Eccles and his colleagues point out, participation in extracurricular sports fosters a sense of belonging to the school,⁹⁷ which can encourage young people to stay in school.

Encadré**Extracurricular activities and student retention**

Data from an American study of 14 249 students in 735 secondary schools indicated that boys and girls who participate in extracurricular sports are 70% less likely to drop out of school than students who do not.²⁰⁵ Note, however, that this statistical relationship, although significant, does not necessarily indicate a causal relationship.

Fin de l'encadré

1.5 SOCIAL SKILLS

Sport and physical activity participation can help young people adapt socially and break out of their isolation.²³ For example, sports can help young people who share preferences and interests develop feelings of belonging to a team, a club or a community and thus help them create their own social networks.^{97,344} However, these beneficial effects do not appear automatically: the way sports and physical activities are organized and the conditions under which they are carried out must still be conducive to the development of social skills.

Young athletes are usually more resilient to stress than non-athletes^{26, 202} and more likely to bounce back, adapt and achieve their potential, which could help them maintain good relationships with those around them.

By offering properly structured sports and physical activity programs, we can give young people who are experiencing difficulties an opportunity to develop qualities related to social competence, such as conflict-resolution skills, self-esteem, trust in others, self-control and sportsmanship.^{7, 119}

Sport-related values

A number of explicit and implicit values are associated with sports. All those involved, be they athletes, coaches, managers and even spectators, are expected to show sportsmanship and uphold the basic values of inclusion, non-violence and respect for others and authority. Because these values help youth live well in society, sports may be a way for them to develop their social skills. The challenge is to implement mechanisms and procedures so that sports are organized and played in such a way as to reflect this goal.

1.6 OTHER HEALTHY LIFESTYLE HABITS

Youth who regularly participate in sports and physical activities generally have healthier lifestyle habits, especially with respect to diet^{30,238} and sleep,²²² and engage in fewer risk behaviours (e.g. unprotected sex).²²² The results are less conclusive with respect to drug and alcohol use,^{23, 75, 267} since studies have shown that young people who play sports consume more alcohol.^{23, 75} While the link is less strong for adults, active young people, especially girls, are less likely to smoke.^{165, 222}

Although a cause-effect relationship may not necessarily exist, since healthy lifestyle habits may instead result from a family's socioeconomic status and parenting approach, one can conclude nonetheless that young people who exercise to stay in shape or who compete in sports tend to develop lifestyle habits that help them achieve their goals.

1.7 PHYSICAL ACTIVITY IN ADULTHOOD

Some studies,^{176, 302, 319} although not all,¹⁴⁴ point to a relationship between physical activity levels during adolescence and during adulthood.

As mentioned earlier, there is no doubt that physical exercise during childhood and adolescence helps develop motor coordination, and that motor skills it easier to participate in sports and physical activities. In addition to wanting to stay in shape, youth who exercise regularly may want to continue having enjoyable and stimulating experiences as adults.

2. GUIDELINES FOR SPORTS AND PHYSICAL ACTIVITIES

One might wonder about the type, intensity, amount and frequency of physical activity children and adolescents should engage in. A number of nationally and internationally renowned scientific and medical organizations have studied this question and proposed guidelines.

2.1 MAIN GUIDELINES

Scientific and medical organizations have tended to base their guidelines on those designed for adults and to justify their choices by referring almost exclusively to the beneficial effects of exercise on physical health. In general, these organizations recommend a daily or weekly amount of physical activity. A few of them add strength training exercises and recommend reducing the amount of time spent in sedentary leisure activities such as watching television, surfing the Internet and playing video games.

Organization, year	Age	Guidelines
1. American College of Sports Medicine, 1988 ¹⁰	Children, adolescents	<ul style="list-style-type: none"> • VPA 20 to 30 min/day
2. International consensus conference on physical activity guidelines for adolescents, 1994 ²⁶⁹	Ages 11 to 21	<ul style="list-style-type: none"> • PA every day or almost • MVPA at least 20 min/day, at least 3 days/week • Varied PA that could include MSE
3. National Institutes of Health, United States, 1995 ²²⁴	Any age	<ul style="list-style-type: none"> • MPA at least 30 min every day or almost • Increased level of MPA and VPA, if possible
4. Surgeon General, United States, 1996 ³²⁶	≥ age 2	<ul style="list-style-type: none"> • MVPA at least 30 min every day or almost
5. Health Education Authority, United Kingdom, 1998 ³⁷	Ages 5 to 18	<ul style="list-style-type: none"> • MVPA at least 60 min/day • MSE at least 2 days/week • Developmentally-appropriate PA
6. Kino-Québec Scientific Committee, 2000 ⁶³	Children, adolescents	<ul style="list-style-type: none"> • PA every day or almost • MVPA at least 20 min/day, at least 3 days/week • MSE for adolescents • SA limited to a reasonable amount of time
7. American Cancer Society, 2002 ⁴⁷	Children, adolescents	<ul style="list-style-type: none"> • MVPA at least 60 min/day, at least 5 days/week • PA including sports and MSE
8. Canadian Society for Exercise Physiology (CSEP), 2002 ^{2, 3}	Ages 6 to 14	<ul style="list-style-type: none"> • MVPA increased by at least 90 min/day • SA limited to less than 90 min/day
9. Canadian Pediatric Society, 2002 ²⁸⁵	Children, adolescents	<ul style="list-style-type: none"> • MVPA at least 90 min/day • Fun and unstructured PA • SA limited to 90 min/day
10. Weight Realities Division, Society for Nutrition Education, United States, 2003 ³⁴⁶	Children	<ul style="list-style-type: none"> • PA improving strength, endurance and cardiorespiratory fitness at least 60 min/day • SA limited to less than 120 min/day
11. National Association for Sport and Physical Education, United States, 2003 ⁶⁸	Ages 5 to 12	<ul style="list-style-type: none"> • MVPA at least 60 min (up to a few hours), every day or almost • Age-appropriate PA, especially of an intermittent nature • SA limited to less than 120 min/day, especially during the day
12. Department of Health and Ageing of Australia, 2004 ^{84, 85}	Ages 5 to 18	<ul style="list-style-type: none"> • MVPA at least 60 min/day (up to a few hours) (gradual increase for sedentary people) • Varied PA • SA limited to less than 120 min/day, especially during the day
13. U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005 ³²⁹	Ages 5 to 12	<ul style="list-style-type: none"> • PA at least 60 min/day, every day or almost
14. Division of Nutrition and Physical Activity, Division of Adolescent and School Health, Centers for Disease Control and Prevention, United States, 2005 ²⁹⁵	Ages 5 to 18	<ul style="list-style-type: none"> • MVPA at least 60 min/day • Fun, varied, developmentally-appropriate PA
15. U.S. Department of Health and Human Services, 2008 ³²⁸	Ages 6 to 17	<ul style="list-style-type: none"> • PA at least 60 min/day • Aerobic MHIPA at least 3 days/week

		<ul style="list-style-type: none"> • MSE at least 3 days/week • Weight-bearing PA at least 3 days/week • Fun, varied, developmentally-appropriate PA
16. Canadian Society for Exercise Physiology and ParticipACTION 2010 ²⁸⁶	Ages 5 to 17	<ul style="list-style-type: none"> • MVPA at least 60 min/day (up to a few hours) • Aerobic activities most of the time • MSE at least 3 days/week • Weight-bearing PA at least 3 days/week • SA limited to less than 120 min/day
17. World Health Organization 2010 ³⁴⁹	Ages 5 to 17	<ul style="list-style-type: none"> • MVPA at least 60 min/day • Aerobic activities most of the time • MSE at least 3 days/week

PA: physical activity
VPA: vigorous physical activity
MPA: moderate physical activity
MVPA: moderate and vigorous physical activity
SA: sedentary activities (video games, television, the Internet)
MSE: muscular strength exercises

The first guidelines based on a wide-ranging review of the literature are those of England's Health Education Authority,³⁷ which recommends that children and adolescents do:

- a minimum of 60 minutes of moderate and vigorous physical exercise daily
- muscle strengthening exercises twice a week

In 2002, Health Canada and the Canadian Society for Exercise Physiology jointly issued more ambitious guidelines, recommending that youth aged 6 to 14 increase their daily volume of physical activity by 90 minutes.^{2,3} They proposed a novel approach: gradually increasing the time devoted to physical activity and decreasing screen time. Unfortunately, the wording of these guidelines is somewhat confusing: it seems rather strange to suggest that girls and boys who are already physically active should, like those who are less active, increase their daily physical activity by 90 minutes.

Encadré

Does publishing physical activity guidelines automatically lead to an increase in physical activity?

According to a 2003 Canadian study, many people (37%) claimed they knew of the existence of *Canada's Physical Activity Guide*, but few (4%) were familiar with its recommendations.⁵⁰ Those who said they were familiar with the recommendations or the existence of the guide were nonetheless more likely to be physically active.

Fin de l'encadré

The most recent American guidelines are the *2008 Physical Activity Guidelines for Americans*³²⁸ issued by the U.S. Department of Health and Human Services. These guidelines are for adults and youth and are based on a detailed and exhaustive review of relevant scientific literature by a group of 47 experts.²⁴⁰ According to the guidelines, children and adolescents should do 60 minutes or more of physical activity every day. The Department goes so far as to specify the type of physical activities and their frequency. (Table 6)

TABLE 6 – RECOMMENDATIONS OF THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES CONCERNING THE TYPE, FREQUENCY AND DURATION OF SPORT AND PHYSICAL ACTIVITY FOR CHILDREN AND ADOLESCENTS, 2008

Type of physical activity	Recommendations
Aerobic	Most of the 60 or more minutes a day should be either moderate-or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.
Muscle-strengthening	As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity* on at least 3 days of the week.
Bone-strengthening	As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.

*: These are not necessarily actual bodybuilding sessions.

Source: U.S. Department of Health and Human Services (2008)³²⁸

The most recent Canadian physical activity guidelines are also based on a systematic review of scientific literature.¹⁷² Issued in May 2010 by the Canadian Society for Exercise Physiology and ParticipACTION, they recommend at least 60 minutes of moderate physical activity daily for young people aged 5 to 17 (30 minutes for very inactive or sedentary children and youth).²⁸⁶ It should be noted, however, that some physical activity is better than none, and more is better. The type, frequency and duration of the activities are similar to those of the U.S. Department of Health and Human Services. (Table 6) The physical activity can be accumulated through play, games, sport, work, active transportation, recreation, physical education or planned exercise.²⁸⁶

In August 2010, the World Health Organization (WHO) published physical activity guidelines with a view to providing policy makers with guidance on the relationship between physical activity and the prevention of non-communicable diseases.³⁴⁹ On the basis of the most recent scientific evidence, the WHO recommends that youth aged 5 to 17 accumulate at least 60 minutes daily of moderate and vigorous physical activity. As recommended in the American and Canadian guidelines, most of the physical activity should be aerobic and incorporate vigorous activities including those that strengthen muscle and bone, at least three times per week. It is interesting to note that the guidelines suggest gradually increasing the duration, frequency and intensity of exercise for inactive youth. The guidelines also point out that everyone can reap the benefits of physical exercise, regardless of their level of physical activity.

Encadré

Daily number of steps

Other guidelines are aimed more specifically at maintaining a normal weight and are expressed in terms of daily steps. For example, Tudor-Locke and her team³²⁵ recommend that girls and boys walk a daily minimum of 12 000 and 15 000 steps respectively.^h According to Jargo and his colleagues, 8000 of these steps, the equivalent of 60 minutes of physical activity, should be of moderate or vigorous intensity.¹⁵⁸

It should be noted, however, that not all pedometers are reliable²⁸ nor do they always accurately reflect the level of physical activity, especially if youth engage in other activities, such as cycling, swimming and jumping-related activities such as skipping and hopping.²⁸⁴ Youth physical activity guidelines that are based solely on the daily minimum number of steps may therefore be incomplete and inappropriate.

Fin de l'encadré

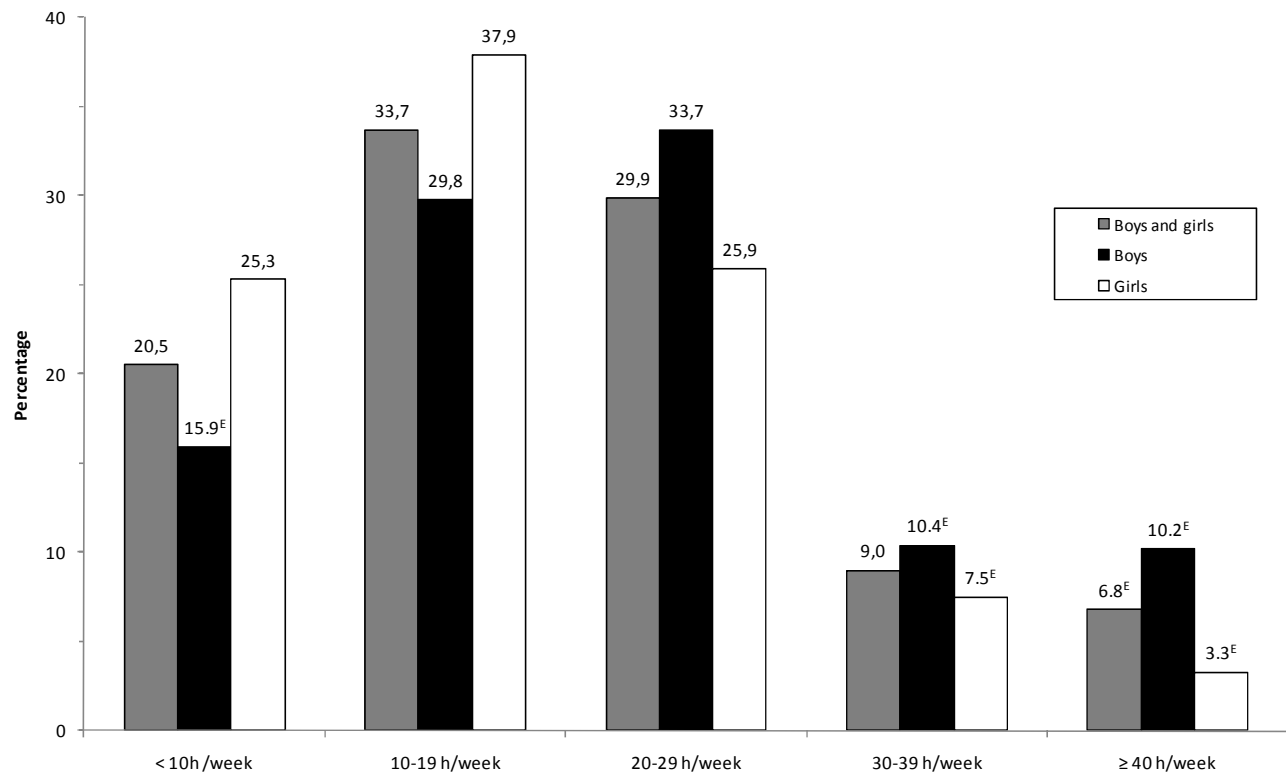
2.2 SHOULD SEDENTARY LEISURE ACTIVITIES BE LIMITED?

One is tempted to attribute the problems caused by inactivity and excess weight among young people to sedentary leisure activities such as watching television, playing video games, texting, instant messaging, chatting and surfing the Internet. This is why 7 of the 17 guidelines recommend keeping sedentary leisure activities to a minimum (see Table 5). But can sport and physical activity really be promoted by limiting sedentary activities?

^h Threshold below which girls and boys were likely to be overweight.

There is no doubt that young people engage in a high level of sedentary activity. In 2004, 45.7% of Québec youth aged 12 to 17 devoted 20 or more hours a week to sedentary activities (Figure 4).²⁸⁹ In Québec, as in the rest of Canada, boys were more likely than girls (Québec: 54.3% and 36.7%; Canada: 61.0% and 51.9%) to spend 20 hour or more per week in front of a screen.²⁸⁹ These results are in keeping with the findings of a recent literature review carried out in different countries, including the United States and Canada.²⁰⁰ More boys than girls watch television (four or more hours a day) and play video games. Girls spend more time sending and reading text messages.^{187,200} No difference was found between boys and girls who watch television two or fewer hours a day.

FIGURE 4 – PARTICIPATION OF 12- TO 17-YEAR-OLDS IN SEDENTARY ACTIVITIES, IN HOURS PER WEEK, BY SEX, QUÉBEC, 2004



^E: Coefficient of variation between 16.6% and 33.3%; to be interpreted with caution.

Source: Statistics Canada (2007)²⁸⁹

A 2004 Health Canada study revealed that young people aged 6 to 11 and 12 to 17 who logged more than two hours a day or more than twenty hours a week of screen time were much more likely to be overweight and obese than those whose viewing amounted to less than one hour a day or less than ten hours a week.²⁷⁷ A cause-effect relationship can be deduced from these cross-sectional observations. However, like some researchers, we can hypothesize that sedentary activity goes hand in hand with obesity, not only because of reduced energy expenditure, but also because of increased caloric intake.^{160, 256}

Encadré

Knowledge-based work and obesity

While knowledge-based work hardly increases energy expenditure, it could be accompanied by increased spontaneous energy intake.^{56, 57}

Fin de l'encadré

According to other studies, a relationship does not necessarily exist between time spent watching television or playing video games and time spent doing physical activity.^{45, 128, 184, 208, 253} While programs aimed at limiting the amount of screen time have made it possible to decrease the incidence of overweight, they have not helped to increase levels of physical activity.^{251, 300} It is not clear whether efforts to reduce the amount of time in sedentary activities automatically result in increased physical activity.²⁹⁴

Furthermore, according to a recent analysis of the data from the Québec Longitudinal Study of Child Development (1314 children), each weekly hour of television exposure at 29 months of age is associated, in grade four of elementary school, with:

- a 13% decrease in weekend physical activity
- a 9% decrease in vigorous physical activities
- a 9% decrease in physical fitness
- a 10% increase in victimization by classmates²³⁴

It should be noted that the American Academy of Pediatrics recommends discouraging television viewing for children younger than two years and limiting media time to two hours a day after this age.⁹

2.3 RESISTANCE TRAINING: YES OR NO?

It was long thought that youth should not engage in resistance training. However, in 2008, the Canadian Society for Exercise Physiology took a position on resistance training for youth (from preadolescence, about 11 years of age for girls and 13 years of age for boys, up to the age of 18),³² as did the American Academy of Pediatrics in 2001,⁶⁷ and the National Strength and Conditioning Association of the United States in 1996 and in 2009.^{103,104} According to the literature reviewed, resistance training done under qualified supervision can yield functional and health benefits. The Canadian Society for Exercise Physiology therefore recommends that:

“low- to moderate-intensity resistance exercise should be done 2-3 times/week [...], with 1-2 sets initially, progressing to 4 sets of 8-15 repetitions for 8-12 exercises.”³²

In order to develop muscular strength, coordination and balance, the exercises

could include weight training, balance exercises and plyometrics.ⁱ The emphasis should nonetheless be on movement control and not on the weights *per se*.

It is nonetheless preferable to wait until young people want to do strength training and are able to follow instructions, which usually occurs around age seven. Weight training in a gym with weights and equipment is not suitable for younger children. As the U.S. Department of Health and Human Services suggests, it is probably a better idea to offer muscle-strengthening activities as part of play such as tug-of-war, gymnastics and tree climbing.³²⁸

Even though resistance training is not contraindicated and can have documented beneficial effects in both young people and adults, we should remember that the ideal is not to have adolescents follow a rigorous muscle-strengthening exercise program, but rather to encourage them to discover the pleasure of integrating various sports and physical activities into their everyday lives, including activities that will help them strengthen their muscles and bones.

Encadré

Most of the guidelines and their general interpretation have a number of shortcomings that are described in Appendix III. In developing the following recommendations, the Kino-Québec Scientific Committee has attempted to remedy these shortcomings. These recommendations can be used to draw up new guidelines.

Fin de l'encadré

2.4 RECOMMENDATIONS

Given that:

- **frequent and continuous sport and physical activity has well-documented beneficial effects on physical fitness and physical health, as well as increasingly well-documented beneficial effects on mental health, and that physical activity is associated with a number of other benefits**
- **these effects and benefits are of particular importance today given the problems involved, such as obesity and cardiovascular disease**
- **most of the beneficial effects disappear if physical activity is interrupted, which is the case for a high percentage of adolescents**

ⁱ Training method in which the muscles are stretched and contracted in rapid succession to increase their reaction power and speed. (Office québécois de la langue française) [This is a free translation.]

- each type of physical activity yields specific benefits, but that no physical activity alone produces all the potential positive effects of all sports and physical activities taken as a whole
- there is no “minimum” physical activity threshold, that some physical activity is better than none, and that the more physical activity a person does the better (except in extreme, very rare cases)
- the effects of a given training session on physical fitness and health vary considerably from one person to the next, both in youth and in adulthood
- not all young people can attain the same level of physical fitness
- some young people find it more difficult to increase their level of physical activity
- there are critical periods for developing certain motor and physical skills
- young people, and especially children, generally prefer intermittent activity to prolonged activity with little variation in intensity
- the amount of physical activity obese youth require in order to lose weight and then maintain their weight is higher than that generally recommended for young people of normal weight
- the likelihood of adopting and maintaining a physically active lifestyle is determined by both individual and environmental factors such as the physical, social, economic and political environment
- certain sports and physical activities are of particular importance given Québec's cultural and geographical context
- parents must invest time and money to ensure that youth participate in sports and physical activities

in drawing up new guidelines, the Kino-Québec Scientific Committee makes the following recommendations:

1. Children and adolescents should engage in as many physical activities as possible: games, recreation, organized or non-organized sports, physical education classes, active transportation, everyday activities, etc. The greater the amount, intensity and variety of activities, the greater the beneficial effects will be (except, of course, in the case of excessive training).

2. While emphasizing activities that are appropriate to Québec's culture, geography and northern climate, the activities should, as much as possible, be diversified, improve and maintain the various components of physical fitness, and be consistent with the suggestions given in tables 7 and 8.
3. The intensity and other parameters of sports and physical activity sessions should be gradually increased according to individual needs. The conditions under which these activities are introduced and carried out should make the experience enjoyable and gratifying and be adapted to an individual's profile, including his or her:
 - a. aptitudes and level of physical fitness
 - b. motivation
 - c. development and maturity:
 - as early as possible, propose activities that help develop basic motor skills
 - propose adapted forms of different sports (e.g. minitennis, minibasketball, minivolleyball, team sports played on smaller fields), without neglecting spontaneous and unstructured forms of these sports
 - wait until the end of puberty to propose vigorous or muscle-strengthening exercises
 - d. state of health: offer overweight youth with a handicap or medical condition (e.g. asthma, diabetes, high blood pressure) physical activities that are appropriate to their condition. (It may be necessary to consult a professional.)
- 4.
5. Young people's level of physical activity cannot be increased simply by limiting the amount of time spent in sedentary activities; however, if this approach is used, sport and physical activity should be suggested as a way to occupy the additional free time.
6. For youth who play organized sports:
 - encourage young people not to focus on performance but rather to develop a love of sports
 - provide a structure that promotes continued participation in sport and physical activity
 - organize activities so that youth can learn and perfect basic skills,

while they enjoy pleasant and gratifying experiences that foster self-esteem and the development of social networks. The structure should be appropriate and the activities should consist of games where winning isn't everything. If these experiences encourage young people to compete, care should be taken to ensure that training is increased slowly and that it is consistent with young people's level of maturity and profile

- ensure that parents, youth physical activity leaders and coaches (who, besides parents, are often young people's first role models for adult behaviour) set a good example:
 - by doing sports and physical activities safely
 - by applying and transmitting sports values, particularly fair play
 - by promoting the virtues of sport and offering youth the possibility of discovering how a sport is organized, its rules, history, highlights, etc.
- 7. Priority should be given to policies, programs and measures whose value has been proven by research, or that stem from theories or models founded on the principles of environmental psychology.
- 8. Individual and environmental determinants (e.g. physical, social, economic and political factors) must be taken into account.
- 9. Whenever possible, young people should participate in developing and implementing ways to promote sport and physical activity programs.
- 10. Policies, programs and measures must be evaluated, and information on best practices disseminated as a guide to future action.
- 11. The viewpoint of key people (parents, health and education professionals, youth physical activity leaders, elected representatives, opinion leaders, etc.) must be taken into account so that they can help promote youth sport and physical activity.

The Kino-Québec Scientific Committee recognizes the merits of the guidelines issued by different groups of experts. However, it considers that they were written for the most part from a biomedical rather than a behavioural point of view. It is frequency that should be stressed when promoting a given behaviour. This premise is all the more important when the recommendations concern youth. The Committee therefore wishes to ensure that attention will be paid to the frequency

and regularity with which children and adolescents participate in sports and physical activities. This is why the Scientific Committee has departed from the guidelines published so far by recommending that young people “do as much physical activity as possible.” This could mean, for example, changing the message of awareness campaigns, which have always emphasized the daily number of minutes of physical activity (e.g. 30 or 60 minutes).

However, the Committee recognizes that for those who wish to use guidelines, organizations such as the U.S. Department of Health and Human Services, the Canadian Society for Exercise Physiology in cooperation with ParticipACTION and the WHO recommend that youth accumulate at least 60 minutes a day of moderate and vigorous physical activity. The Committee reiterates that doing even a little physical exercise may be beneficial for inactive youth, and that beyond 60 minutes a day the beneficial effects are increased.

Since young people have different profiles, “do as much physical activity as possible” could mean a modest increase in frequency for those who do not have the physical fitness, health, aptitudes or conditions necessary for sustained participation in sports and physical activities, whereas the increase will be greater for others. However, regardless of the size of this increase, it is bound to result in beneficial effects.

Encadré

Examples of basic motor skills

Crawling	Changing direction	Skating
Running	Jumping	Skiing
Lateral running	Catching	Swimming
Climbing	Throwing	Diving
Sliding	Hitting (a ball)	Dancing
Walking backwards	Dribbling	
Running backwards	Juggling	

Fin de l'encadré

TABLE 7 – SPORTS AND PHYSICAL ACTIVITIES: RECOMMENDED TYPE, FREQUENCY, DURATION AND INTENSITY

Sports and physical activities for...	Type and intensity of activities	Examples of sports and physical activities	Frequency and duration	
...developing basic motor skills	<ul style="list-style-type: none"> ○ Basic skills exercises ○ More complex and diversified exercises ○ Low, moderate and high intensity 	<ul style="list-style-type: none"> ○ Exercises involving basic motor skills: aquatic games, dodge-ball, trampoline 	<ul style="list-style-type: none"> ○ As often as possible, from early childhood ○ Of short enough duration to capture participants' attention and keep their interest 	
... developing social networks and social skills	<ul style="list-style-type: none"> ○ Group and individual sports ○ Moderate and high intensity 	<ul style="list-style-type: none"> ○ Ice hockey, diving, softball, baseball, basketball, volleyball, soccer, handball, track and field, cheerleading, racquet sports, outdoor activities 	<ul style="list-style-type: none"> ○ As often as possible, depending on level of interest ○ Duration appropriate to the given activity 	
...improving and maintaining cardiorespiratory fitness	<ul style="list-style-type: none"> ○ Continuous aerobic activities or, preferably, intermittent activities ○ Moderate and high intensity 	<ul style="list-style-type: none"> ○ Cycling, swimming, soccer, cross-country skiing 	<ul style="list-style-type: none"> ○ Ideally every day, as much time as possible ○ High-intensity aerobic activities at least three times a week ○ Duration adjusted to the frequency of sessions in order to maximize the total weekly time of physical activity 	
...controlling weight				...strengthening bones
... strengthening muscles	<ul style="list-style-type: none"> ○ Resistance exercises ○ Moderate and high intensity 	<ul style="list-style-type: none"> ○ Climbing, gymnastics, tug-of-war, free standing exercises, muscle strengthening exercises without equipment and, for adolescents only, resistance training with equipment and under professional supervision 	<ul style="list-style-type: none"> ○ At least three times a week ○ Of short enough duration to maintain interest 	

TABLE 8 – ASPECTS TO FOCUS ON DEPENDING ON LEVEL OF MATURITY

Level of maturity (age) [*]	Aspects to be emphasized
Childhood (0-10 years)	<ul style="list-style-type: none"> • Enjoyment of physical activity, play • General and basic motor skills, particularly those related to personal safety and the safety of others • Weight-bearing activities
Late childhood (10-12 years)	<ul style="list-style-type: none"> • Enjoyment of sports and physical activities • Motor skills • Weight-bearing activities • Personal hygiene • Ethical behaviours in competition • Social network
Start of puberty (13-14 years)	<ul style="list-style-type: none"> • Enjoyment of sports and physical activities • Skills that maximize enjoyment of practising preferred sports • Other motor and sports-related skills • Weight-bearing activities • Personal discipline • Ethical behaviours in competition • Social network • Self-esteem
Mid-puberty (15-16 years)	<ul style="list-style-type: none"> • Enjoyment of sports and physical activities • Desire to work hard • Basic strategic skills • Advanced technical skills • Physical qualities: <ul style="list-style-type: none"> ○ VO₂max ○ aerobic endurance • Ethical behaviours in competition and society
End of puberty (17-18 years)	<ul style="list-style-type: none"> • Enjoyment of sports and physical activities • Aerobic fitness • Muscle power • Physical and mental qualities • Ethical behaviours in competition and society • Complex strategic skills • Specialization in a sport, if desired

* Level of maturity varies from one child to the next: some boys and some girls may attain a given development stage one or two years earlier, others, one or two years later.

3. PHYSICAL ACTIVITY DETERMINANTS IN YOUTH

Effective policies, programs or measures to promote sports and physical activities should be based on an understanding of the factors that encourage or discourage participation in these activities and of the process that ensures a physically active lifestyle. A number of theories and models have been proposed in this regard.^j Founded on the principles of environmental psychology, they deal not only with individual perceptions, cognition and thoughts, but also with the environmental factors that can determine the strength of the intention to adopt a given behaviour and that then transform this intention into action.

Encadré

Favourable environment

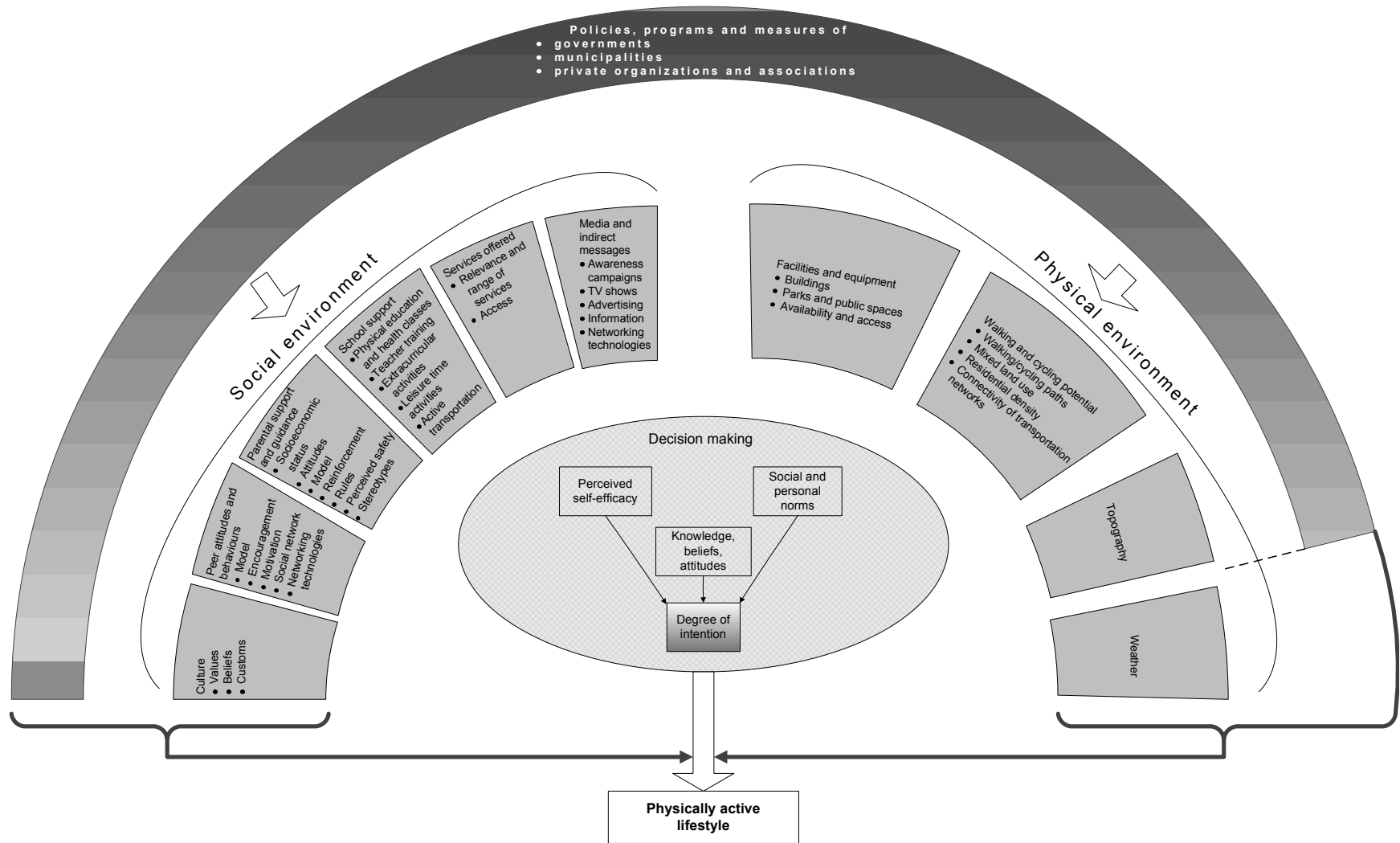
A group of Québec authors define an environment conducive to healthy lifestyle habits and the prevention of weight-related problems as being: “All the physical, sociocultural, political and economic elements that exert a positive influence on diet, physical activity, body image and self-image. These elements must be considered in terms of objective or perceived reality and the complexity of their interrelationships.”²¹⁵

Fin de l’encadré

These theories and models, like the model we propose, make it possible to better understand how youth physical activity is determined by factors relating to the social environment, the physical environment, policies, programs and measures.²⁶⁶ These can be taken into account in identifying the people and elements that can directly or indirectly influence young people’s participation in sports and physical activities.

^j E.g. Fishbein’s and Ajzen’s theory of reasoned action;¹⁰⁹ Ryan’s and Deci’s theory of self-determination;²⁶¹ Ajzen’s theory of planned behaviour;¹⁴ Bandura’s cognitive social theory;²⁰ Rosenstock’s health beliefs model;²⁶⁰ Hume’s social ecological model of physical activity³³³ based on Davison and Birch’s model for weight control;⁷⁷ Kino-Québec’s model of determinants for a physically active lifestyle;¹⁷⁴ Godin’s integrative model of health behaviour determinants and the process for changing them;¹²⁵ Prochaska’s and DiClemente’s transtheoretical model.²⁴³

MODEL OF DETERMINANTS FOR YOUTH PHYSICAL ACTIVITY



It goes without saying that the determinants presented in this model are influenced by the social and macroeconomic contexts, which affect the ability of government, municipalities and organizations to implement policies, programs and measures that promote sport and physical activity.

Some of the factors presented in our model cannot be modified at all (or only very little) by policies, programs or measures. Listed in Table 9 below, these factors can nonetheless help target groups that require particular attention, such as Québec girls aged 6 to 17 who, as we saw previously, are less active than their Canadian counterparts. Young people with poor motor skills should also receive special attention.

TABLE 9 – UNCHANGEABLE OR SLIGHTLY CHANGEABLE FACTORS RELATED TO SPORTS AND PHYSICAL ACTIVITY

Biological factors	
Sex	Girls are less active than boys ^{134, 155, 267, 332, 334} and receive less parental support. ^{51, 115}
Age	Participation in physical activity decreases with age; ^{267, 307, 334} this decline tends to occur earlier among girls than boys.
Weight	Some studies, ^{77, 160, 307} although not all, ^{152, 267, 334} indicate that excess weight is associated with a low level of physical activity.
Genetics	Some children are genetically predisposed to be active, others to be sedentary, ²⁸⁰ but family environment appears to play a key role. ²⁷⁴
Childhood development	Early maturing children who mature early are more active, but the decline in physical activity in adolescence is often more pronounced. ⁹³
Sociodemographic factors	
Family structure	It appears that young people from families in which the father works full time and the mother works part time tend to do more sports. ⁵⁹ Girls from single-parent families are less likely to do sports. ⁵⁹
Family income and socioeconomic status	Family income is generally positively associated with young people's participation in sports and physical activities, ^{59, 108, 193} but it appears that young people from more disadvantaged homes can compensate for their low participation in organized activities by taking part in free activities. ^{267, 339}
Ethnic origin, social integration and language spoken	People from cultural communities and young people whose parents immigrated to Canada less than ten years earlier tend to be less physically active during leisure time than the population as a whole. ^{59, 60} The same is true of francophones when their participation is compared with that of Québec's anglophones. ²⁸⁸
Physical environmental factors	
Topography	For children, steep inclines on the way to and from school is negatively associated with active commuting (walking and cycling). ³⁰⁹
Weather	Despite the fact that snow accumulation is associated with physical

activity among adolescents, youth in general are less active when it rains or snows. ^{33, 323}

3.1 DECISION MAKING

In this context, decision making means the process by which one decides to be active or inactive, according to one's abilities, social and personal norms, knowledge and beliefs. Social cognitive theories make it possible to better understand the decision-making process. Intention, which reflects the degree of motivation, is obviously a key determinant of physical activity in youth:¹²⁶ it goes without saying that intention precedes action.

Self- efficacy

In order to have the intention of participating in sports or physical activities, young people must believe they are able to do so and can overcome any barriers involved. This is what is called self-efficacy. The stronger this feeling is, the more active girls and boys will be.

Previous experiences help develop self-efficacy. Thus, early on, young people should be given opportunities to experience success related to sport and physical activity so that they can become more confident in their own abilities. In particular, this involves helping young people develop their motor skills from early childhood.

Encadré

Self-efficacy and maintaining physical activity

According to an American longitudinal study of 371 youth aged 12 to 17, young people with the most positive change in self-efficacy beliefs experienced less of a decline in physical activity.⁹³

Fin de l'encadré

Social and personal norms

In this case, social norms—another determinant of intention—refer to the perception a person has of the positive or negative pressure that parents and peers exert regarding the importance of being active or inactive.^{127, 147} Thus, boys and girls who believe their family and peers would like them to be active and approve of them being active have a stronger intention of being active. This intention will be

that much stronger if the young person wants to meet expectations. The same is true if a person's circle of friends values sport and physical activity.¹⁴⁷ Thus, the norms and behaviours of peers have a combined effect on youth physical activity.

Personal norms, or self-identity, refer to the way in which a person sees himself or herself with respect to a given behaviour. Young people might regard active people as being self-assured, intelligent, popular, motivated and physically fit,¹⁷¹ and if they view this image as attractive, they will want to conform to it by being physically active themselves.³⁴

Many boys view sport as an activity that allows them to assert their masculinity and leadership, while many girls see it as “babyish” as they get older.²⁵⁰ For some girls, physical activity is not part of what it means to become a woman, so they are less likely to participate in it during their leisure time.

Knowledge, beliefs and attitudes

Knowledge and beliefs about an activity allow young people to identify its advantages and disadvantages and therefore influence their attitude.^{126, 332}

Most young people consider physical activity to be important and believe in its positive effects.²⁵⁰ However, this belief does not appear to be an important motivating factor,^{267,332} unlike the enjoyment associated with sport and physical activity.^{126, 250} In the *Enquête québécoise sur les activités physiques, sportives et de loisir*, young people aged 15 to 24¹⁵³ said they participated in sports and physical activities more for the fun of it (44%) than for the benefits on health and well-being (22%). Other motivating factors included:

- physical appearance, weight loss, muscle development, improvement of physical fitness and staying in shape (17%)
- relaxation, distraction, having time for oneself, or stress release (10%)
- meeting people, thrill seeking and learning new things (7%)

A number of young people are motivated by aesthetic concerns,^{8, 151} which explains why they are likely to discontinue physical activity if they do not feel that the change in appearance or weight is rapid or sufficient enough.^{6,250} Consequently, other benefits of sports and physical activity should be emphasized.

Young people, especially girls, see participation in sports and physical activities as a way of consolidating and expanding their social network.^{6, 250} Combining sports and recreational facilities and organizing social activities in conjunction with sports can provide many opportunities for socialization and thereby attract more girls.

Lastly, competition and structure can motivate many young people. According to a Québec study, those who participate in competitive sports and physical activities at the beginning of secondary school are more likely to maintain their level of participation through to Secondary V.¹²⁶ However, competition may cause some young people to give up these activities.^{6, 250} Since physical activity carried out in a non-competitive and non-organized context is also worthwhile, it is important to let young people decide for themselves whether or not they want to compete.

Encadré

According to a Québec survey, the main reasons why 15- to 24-year-olds are not as active as they would like to be include lack of time, energy, interest or motivation.¹⁵³

Fin de l'encadré

3.2 SOCIAL ENVIRONMENT

The social environment consists of a number of non-physical elements that influence both young people's intention to be physically active and their decision to follow through on this intention. Above all, this involves:

- **the past and current cultural environment**
- **the attitudes and behaviours of people with whom they interact (parents, friends, teachers, activity leaders, coaches)**
- **the type of support they receive from their parents and school**
- **the variety and type of services offered**
- **the television shows and advertising that promote sports and physical activities**
- **the educational messages they receive**

3.2.1 Culture

Culture represents the shared values, beliefs and customs of a particular group, be it religious, ethnic, municipal, national or, in this case, age-related.¹²³ Culture helps to determine or modify social norms that dictate the right thing to do. It also influences the cognitive processes of young people and members of their family, social circle, school community and sports teams.

Québec youth do not all share the same culture, but have certain characteristics in common that can negatively affect their level of participation in sports and physical

activities. For example, in an attempt to define their identity and fit in, today's teens are greater consumers than previous generations. However, consuming goods and services is expensive, which often leads young people to work several hours a week. In Canada, in 2004-2005, one out of three 15- to 17-year-olds had a job.³³⁰ As a 2004 American study involving 12 073 tenth graders and 5 500 twelfth graders revealed, the more hours students work per week, the less time they have for physical activity and team sports.²⁴⁵

3.2.2 Peer attitudes and behaviours

Peers have a strong influence on adolescent behaviour.^{92, 267, 332} Example and encouragement, particularly among girls, can motivate more sedentary girls to exercise.^{157,250} Discovering sports and physical activities and, above all, participating in them with peers is a source of motivation and enjoyment. It should be remembered that enjoyment is one of the main reasons that young people continue to participate in an activity.^{157, 250, 272}

Encadré

Importance of social support for girls

A qualitative study carried out in Québec involving Secondary III girls from different socioeconomic backgrounds revealed that adolescent girls are more likely to engage in sport or physical activity if a close friend is also doing so.¹⁷⁸

Fin de l'encadré

As mentioned earlier, social networks play a major role in adolescent life. The fact that participation in sports and physical activities enables young people to develop ongoing relationships with their peers and to meet new people can often be a key motivating factor.^{272, 303}

For young people, the decision whether or not to adopt certain behaviours (e.g. smoking, playing sports) can be regarded as a way of showing that they belong to a group.¹⁷¹ Thus, the norm within a group can strongly influence whether or not young people, especially girls, participate in physical activity. While some girls may be surrounded by female friends who play sports and encourage them to do likewise, others may be part of a group in which sport and exercise are not valued, and often even denigrated.¹⁵⁷

An American study carried out under the *Trial of Activity for Adolescent Girls*

(TAAG) program focused on how 11- to 15-year-olds view girls who are physically active.³⁴⁰ The results showed that boys, like girls, sometimes regard active girls as tomboys or overly aggressive. Because they feel inadequate if girls are better than they are, some boys seem to be uncomfortable with physically active girls. In contrast, both girls and boys are harsh, and sometimes even cruel, in their judgment of inactive girls, calling them “lazy” and “fat.” It therefore seems that some young people regard sedentary girls as less “cool” than active girls.

According to the same study, boys can change girls’ beliefs about participating in sports and physical activities. Thus, girls reported being teased and ridiculed by boys, which can cause them to give up or avoid sports and physical activities.

Given the strong influence of peers on youth's behaviour, the segmentation of their attitudes and culture, and the fact that these change and evolve, we still face the challenge of how to capitalize on the importance of peer influence to promote a physically active lifestyle among young people.

3.2.3 Parental support and guidance

The support of friends, family and significant others is a key factor, particularly during transitional periods (e.g. from elementary to secondary school). As children grow up, the influence of friends becomes increasingly important.^{134, 244} Nevertheless, parents remain a major source of support for adolescents.¹¹⁸ By instilling healthy lifestyle habits early in childhood, parents can help their children make more informed choices regarding sports and physical activities.¹⁹⁴

Parental support can take different forms: encouraging young people; acting as a coach and playmate; making it easier to acquire equipment; providing transportation and creating opportunities to be active.^{134, 220, 267, 317, 332} Parents also have an influence on their children's intention to be active and their beliefs and self-efficacy with regard to sports and physical activities.^{41, 126, 134, 173, 317}

Parental attitudes also determine the type of physical activities children choose, as well as the intensity and regularity of their participation.¹¹ The more positive the parents’ attitudes, the more likely children are to engage in physical activity and to continue to do so. Moreover, parents who consider physical activity to be important are more inclined to support their children regardless of their own level of physical activity.³¹⁶

Children of active parents tend to be more physically active because their parents give more importance to physical activity and can therefore provide the necessary

support.^{51,317} Contrary to what one might think, it seems that the simple fact of parents being active is not enough to encourage children to participate in sports and physical activities. However, it is undoubtedly preferable to have at least one active parent as a role model rather than two sedentary ones.^{59, 126}

Parents can also encourage their children to engage in sports and physical activities by reinforcing this behaviour. Children will be more inclined to exercise if there is a positive consequence for doing so:¹⁴⁹ spending more time with their parents, being praised at the end of a physical activity, receiving a congratulatory smile or words of encouragement, etc.

Parental influence can take other forms, such as choosing where to live. This choice obviously depends on a variety of factors, including family income. However, it must be recognized that housing decisions are influenced, among other things, by opportunities for outdoor play, cycling and walking and access to recreational and sports facilities and equipment.

Time spent outdoors is generally associated with sport and physical activity. Limiting time spent outside as well as reducing opportunities for active transportation could decrease participation in recreational physical activities.^{220, 267, 307}

A child's participation in sports and physical activities can also be influenced by factors of parental influence such as socioeconomic status, value placed on physical activity, and perceptions of a child's athletic abilities, interests, previous performance and development.^{41, 115} Another factor is child gender, since gender-based stereotypes persist. It has been shown that many parents:

- invest more money on physical activity for their sons⁵¹
- do more to foster the development of their sons' motor skills¹¹⁵
- place fewer limitations on opportunities for their sons to play outdoors¹¹⁵

A majority of parents therefore still tend to consider that sports and physical activities are more important for boys than for girls and that their sons have more ability in this regard.^{41, 115, 317} In addition to depriving girls of the support they deserve, this attitude or belief helps perpetuate stereotypes.¹¹⁵

Encadré

Forced participation

Retrospective observations suggest that when participation in organized physical activity during childhood is perceived to be forced, it will result in a lower probability

of participation in sports and physical activities in adulthood.³⁰¹

Fin de l'encadré

Sometimes, parents can unknowingly exert a negative influence on their children's participation in sports and physical activities. We will later see that young people who experience pressure, who are unfairly criticized, or whose parents have unrealistic expectations are more likely to give up sport and physical activity.¹¹³

3.2.4 Support from the school

A recent review of the literature showed that children are more active if they attend a school where the rules encourage participation in sports and physical activities.¹⁰⁸ This indicates the crucial impact that schools can have on youth physical activity.

Physical education and health classes can contribute to the development of motor proficiency, encourage girls and boys to exercise and thus help increase their level of physical activity both inside and outside the school.³²⁰ However, classes can improve physical fitness only if exercises continue to be carried out at a certain intensity level. In general, less than 40% of class time is devoted to moderate or vigorous physical activity,^{105, 204, 219, 281} which is below the 50% level recommended in *Healthy People 2010*.³²⁷ Slight changes could rectify the situation (e.g. modifying rules to increase the intensity of certain games or the number of active players).

The quality of support can influence the duration and intensity of the activities. Studies have shown that classes taught by physical education teachers generally include more moderate or vigorous activities.^{204, 268} Québec students have an advantage over students in other provinces in that most physical education classes are taught by trained teachers, except in schools where there is a shortage of physical education teachers. In 2002, public health directors recommended that all teachers receive additional training with respect to the development of attitudes and behaviours essential to participation in sports and physical activities.⁸⁹

3.2.5 Services offered

The services offered represent an important determinant of participation in sports and physical activities, since they make it easier to take action, particularly for youth living in disadvantaged areas.^{31, 267} If activities are to be popular among youth, they must be adapted to the development level, culture, needs and interests of students.

For example, for young children, emphasis should be placed on introductory and experimental rather than on competitive and highly structured activities.⁶ For adolescents, the social aspect should be underscored by combining socializing and leisure activities sports and physical activities, for example.²⁵⁰

Surveys could be conducted and, where possible, young people could be asked to make choices to ensure that the activities meet their needs and expectations. In addition, the schedule, cost and facilities should be accessible to young people from all sociodemographic backgrounds.²⁵⁵

3.2.6 Public awareness messages

Public awareness campaigns to promote physical activity and sports culture have three main objectives:

- 1- to raise or maintain the standard in terms of the role that sports and physical activities should play in the lives of citizens of all ages
- 2- to reiterate the importance of sports and physical activities as an issue of public interest so that they remain a priority for elected representatives and health and education specialists
- 3- to counteract the mass media campaigns that directly or indirectly promote a sedentary lifestyle,²⁹ notably through social marketing campaigns aimed at bringing about changes in young people's social norms, attitudes and beliefs

To be effective, social marketing campaigns must do more than simply disseminate general information on the benefits of physical exercise. They must also suggest positive behaviours with respect to sports and physical activities.¹⁸¹ Moreover, there is a strategic advantage in establishing a link between the fight against a sedentary lifestyle and campaigns against other widespread public concerns such as smoking, obesity, dropping out of school, etc.

The VERB campaign, held in the United States from 2002 to 2006 with the financial support of the Centers for Disease Control and Prevention,^k is a good example of social marketing. This campaign made it possible to significantly increase children's and adolescents' participation in free time physical activities.¹⁵⁰

Encadré

In order to reach more sedentary youth, it could be useful to design messages that target specific groups. An American study carried out under the *Trial of Activity for*

^k See <http://cdc.gov/youthcampaign>.

Adolescent Girls (TAAG) program made it possible to categorize adolescent girls according to six different types: athletic girls, preppy girls, quiet girls, rebel girls, smart girls and tough girls.²⁸⁷ Study participants were asked to name the best methods for reaching out to adolescent girls in each category. The results, which are very instructive, are presented in Appendix IV. Similar segmentation applied to Québec boys and girls could also make it possible to identify key elements to be included in strategies for promoting physical activity.

Fin de l'encadré

3.2.7 Television characters

Since they are important role models for youth and, as such, shape and influence young people's norms and attitudes, television characters could be used to promote active living.⁵² In Québec, physical activity is seldom portrayed on TV and often the same activities are shown over and over again. Furthermore, young people tend to view the sports or physical activities portrayed merely as a secondary or prop.⁸⁶ Activities represented on screen will probably be valued only if they are associated with characters that young people consider "cool" and with whom they can identify.⁸⁶ Efforts should be made to integrate a variety of team, individual, organized or free time physical activities into fictional shows. In this regard, it will be interesting to see the influence of Télé-Québec's youth television series *Tactik*, which features a soccer team.

3.3 THE PHYSICAL ENVIRONMENT

The physical environment encompasses buildings and the built environment, namely, the structures created and developed by people, particularly sports and recreational facilities, city parks, walking paths and cycling paths.

Recent studies based on ecological models confirm that the physical environment, combined with individual and social factors, influences participation in physical activity.^{18, 106, 122, 186, 252} As a result, the best ways to promote sport and physical activity among youth (and adults) must include measures that focus on the physical environment as much as on the individual. This is the main finding of the report entitled *L'impact de l'environnement bâti sur l'activité physique, l'alimentation et le poids*,³⁵ published by the Institut national de santé publique du Québec.

3.3.1 School and municipal facilities and equipment

A number of studies have revealed a positive relationship between youth physical activity and availability of^{78,191} and access to^{235,267} recreational facilities. For example, according to a study carried out in elementary schools on the Island of Montréal, the availability of storage spaces for equipment increases opportunities¹ to be active before, during and after school.²⁵ A Canadian study reached a similar conclusion.²²³

While play areas must be big enough for children to play in,^{70, 233, 264} appropriate equipment and supervision should also be provided.^{233,264} Elements that encourage the use of play areas include multicoloured markings on the ground, lighting, access to rest rooms, the presence of trees, and facilities that are well maintained and in good condition.¹⁹¹ Lighting and maintenance are particularly important because they help make the facilities safer, which is a key factor in ensuring that they will be used.²⁵⁵

Encadré

The existence of cul-de-sacs may make it easier for young children to take part in unstructured physical activity.³³⁶ Since there is less traffic, parents are justified in feeling that it is safer for their children to play there.

¹ The number of opportunities for being active was determined according to the number of special events related to physical activity, the weekly number of hours of extracurricular sports and physical activity and the percentage of time health and physical education classes devote to motor activities.

Fin de l'encadré

Parks and public spaces are among the most popular places for physical activity.^{121, 306, 336} Young people who live in areas where there are more parks are generally more physically active,^{191, 258} particularly because they tend to walk and cycle more.³¹⁰

However, the proximity of parks does not appear to be the only determining factor for their use. An Ontario study has shown that only one in two parents (49%) went to the park closest to their home.³²⁴ Parents give the following reasons for choosing a playground located further away: number of swings; availability and cleanliness of recreational and sanitary facilities; availability of drinking fountains, shady areas, eating areas (e.g. picnic tables) and play structures for children of all ages, particularly water attractions.^{191, 324, 336}

The availability and accessibility of sports and recreational facilities therefore appear to be the two main factors that encourage their use.

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According to studies carried out notably in the United States and Canada, for many young people aged 15 to 25, the perception that sports and recreational facilities are unsafe and the fear of being bothered by strangers or other young people constitutes an additional barrier to physical activity.^{38, 250}

Fin de l'encadré

3.3.2 Walking and cycling potential

Walking and cycling potential, a concept derived from transportation and urban design,²⁶² refers to a neighbourhood's possibilities for active transportation. According to Vélo Québec's technical guide entitled *Planning and Design for Pedestrians and Cyclists*,¹⁶⁴ areas with high walking and cycling potential are characterized by:

- high residential density, which increases the viability of public transit and local businesses and services
- mixed-use development, which promotes walking/cycling to a wide range of services
- greater connectivity of transport networks, which promotes active

transportation by reducing the number of detours to get from one place to another

A number of studies have revealed a positive association between walking and cycling potential and adult participation in physical activity.^{15, 111} This relationship has not been examined as often with respect to youth,²⁷¹ but initial findings seem to indicate a similar trend.²²⁸ There is no doubt that parents' perception of safety and walking potential has an influence on youth physical activity.

Although the potential for walking and cycling appears to be less important for young children in general, it may be more important among adolescents, who place greater value on being mobile.¹⁴⁸

In short, proper organization of the built environment is key to promoting youth physical activity.³⁵

3.4 POLICIES, PROGRAMS AND MEASURES

Policies, programs and measures refer to all the means governmental and non-governmental authorities can take to promote youth sport and physical activity. Depending on needs, the policies can be formal or informal. The important thing is that the policies, programs and measures be chosen on the basis of their proven or expected effectiveness and that they complement one another.

In the guide entitled *Apprécier ou améliorer des projets pour un mode de vie physiquement actif – Un guide pratique*, Kino-Québec proposed an approach for assessing the value of each type of action centred on the following eight factors: type of project, segment of the target population, objectives, promotion, promoters, partners, logistics and budget.¹⁷⁵ This guide is based not only on convincing data, but also on experience, logic and intuition.^m It could be perfected as we learn more about the value of various strategies for promoting physical activity.

Elected representatives and key figures in civil society must realize how important it is for young people to regularly engage in sports and physical activities. It is also crucial that they be informed about the beneficial effects of an active lifestyle. This information could serve to bolster arguments in favour of political and strategic

^m It would be a mistake to dismiss policies, programs or measures simply because no published data has demonstrated their value, since a number of promising strategies have yet to be evaluated. Acting only on the basis of convincing data could deprive us of potentially useful alternatives.

choices,³⁴¹ which is one of the main goals of the Kino-Québec Scientific Committee.

Québec is on the right path since it has integrated the promotion of youth physical activity in a number of programs and policies. For example, the Fonds pour la promotion des saines habitudes de vie, created in 2007 and funded by the Québec government and the Fondation Lucie et André Chagnon, has made it possible to fund Québec en Forme. The Fonds and Québec en Forme have since merged and now work together to mobilize communities to promote healthy eating and a physically active lifestyle.²⁴⁸ Other programs, while not directly aimed at increasing youth physical activity, can contribute to it indirectly (e.g. revitalizing municipalities, beautifying schoolyards).

While certain laws, regulations and policies are aimed at ensuring everyone's well-being, it is important to ensure that they do not adversely affect participation in sports and physical activities. For example, any consideration of a proposal to make certain protective equipment compulsory must take into account the fact that this obligation could decrease participation in physical activity,^{80, 275} and thus deprive youth of the benefits associated with the sports and physical activities concerned.

4. DETERMINANTS OF SPORT DROPOUT

Increasing youth participation in sport and physical activity involves not only motivating sedentary youth to be more active, but also preventing those who are active from quitting sports.

In secondary school, young people who play competitive sports are less likely to drop out than those who participate in other types of physical activities.⁸⁷ Each year, approximately one third of youth aged 10 to 17 drop out of at least one sport, with the highest dropout rate observed among those aged 11 and 12.^{142, 192} While some simply switch sports, others stop doing sports altogether.

Some American researchers conducted a ten-year retrospective analysis to assess the extent to which 1387 tenth graders participated in sports. While 94% of the subjects had withdrawn from at least one sport since grade one, 55% had taken up a new sport and 30% had stopped playing sports altogether. In addition, the dropout rate increased with each grade level.⁴⁶

A number of studies have attempted to identify the factors that determine whether young people will drop out of or continue to participate in recreational and competitive sports.^{40, 113, 142, 213, 283} The reasons for withdrawing vary according to age, gender, type of sport (team or individual) and type of involvement (recreational or competitive).

During adolescence, when boys and girls acquire new interests and start to weigh the pros and cons of playing sports, various factors can influence their decision to continue or discontinue their participation in a physical activity. Being busier and having more obligations (e.g. school, work, social activities, responsibilities), and therefore less time, seem to be the main reasons for dropping out.

The main personal factors that prompt continued participation in sports and physical activities are enjoyment and desire to meet new challenges, to improve, to be in shape and be part of a team. Conversely, loss of enjoyment and interest as well as an attraction for other activities make it more likely that young people will drop out. Perception of low skill is often behind this loss of enjoyment and interest: adolescents may feel as though they are no longer improving, that they are performing poorly, that they are not important enough, that training is too difficult; or they may feel like they are failing, dislike competition or be unable to deal with pressure. Girls usually attach more importance to these factors than boys.²⁶³

The main environmental factors for dropping out of sports include:

- the atmosphere of the team or club
- the value peers and family place on the activity
- the training staff's attitude and the young person's relationship with this staff
- the relationships among team members
- the parents' involvement and attitude
- the amount of playing time allotted in team sports

Coaches – Coaches who provide little support, exert too much pressure, are autocratic, lack empathy or confidence in their athletes, and have unrealistic expectations may be the reason young people lose motivation, burn out and drop out.¹¹³ Below are some of the main criticisms that young people have regarding their coaches when dropping a sport:

- The coach is not very likeable.
- The coach does not provide enough feedback and encouragement.
- The coach is incompetent.
- The coach is not committed enough.

- The coach favours certain players.
- The coach focuses only on the best players.

Peers – Athletes with positive peer relations in their sport derive more enjoyment and are more committed, while those who find that their sport is in conflict with their social life are less motivated and committed. In addition, having a best friend on the same team is a strong predictor of commitment and continued participation in a sport.¹¹³

Parents – Parental support, involvement, encouragement and satisfaction all increase young people's enjoyment of physical activity, intrinsic motivation and preference for challenge. In contrast, high amounts of pressure, unrealistic expectations, unfair criticism and a lack of support have been associated with decreased enjoyment, increased anxiety, burnout and dropout.¹¹³

Playing time – In team sports, a player who is often “left on the bench” will be more likely to drop out of the sport.

Injuries – Although they are often cited as a factor, injuries do not appear to be a primary reason for discontinuing participation in a sport. Rather, it is the feeling of not being up to standard and the decline in performance stemming from injuries that cause young people to drop out.¹⁶² Girls appear to attach more importance to past experience (physical and psychological trauma) and social considerations (relationships with and comparison with peers), whereas boys are more drawn to the competitive aspects of sports (winning, losing).^{142, 283}

Maturity – Young people's level of maturity can influence their decision to drop out of a sport. Older girls and boys in the same category are more likely to become high-level athletes and will therefore not drop out. This could be explained by a number of factors such as physical and mental maturity, training and competition opportunities and greater attention from coaches.^{113, 61} According to a recent study that compared ten engaged swimmers with ten dropout swimmers, only the dropout swimmers spoke of:¹¹⁴

- early peak performances
- limited one-on-one coaching
- pressuring parents
- few friends on their swim team

In contrast, engaged athletes spoke of their club's developmental philosophies, open communication with coaches and parents, and peer support and positive

influences.¹¹⁴

Encadré

Introduction to physical activity at an early age

Children who are introduced to physical activity at a very early age are more likely to participate and stay in sports as they get older.¹⁹⁷ The way children are introduced to sports at school is strongly correlated with playing sports outside of school and with continued participation.¹⁹⁷

Fin de l'encadré

Early sports specializationⁿ – While early sports specialization is associated with dropping out, later specialization is associated with better performance and continued participation in sports. For example, a study of members of the Russian national swim team, revealed that those who specialized later achieved the international level in less time, were on the national team longer and retired long after those who had specialized at a younger age.²⁷

Likewise, an Ontario study³⁴² revealed that both active and dropout players had invested similar amounts of time in organized hockey practices, competitive and recreational games and specialized hockey training activities (e.g. training camps). However, analysis revealed that the dropout players had begun off-ice training at a younger age (at ages 12-13) and had spent more time in off-ice training than those who did not drop out.

This indicates that early involvement in practice activities that are not enjoyable may ultimately undermine the intrinsic motivation to continue playing sports. Youth sport programs should not focus on intense and routine training, but rather on games and play activities that are fun and enjoyable.³⁴²

Another study compared 25 dropout with 25 active swimmers.¹¹³ It was noted that, with respect to the active swimmers, the dropouts:

had participated in fewer extracurricular activities

- had spent less in unstructured swimming
- had received less one-on-one coaching
- had started swimming training and non-specific training (e.g. strength training in a gym) earlier

ⁿ Early (or precocious) specialization is when a young person specializes in a sport earlier than the average age of specialization for this sport.

- had achieved their peak performance earlier

Furthermore, many dropouts:

- had been the youngest in their training group
- were less likely to have a best friend at swimming
- had parents who had been high-level athletes in their youth¹¹³

All in all, youth should be encouraged during childhood to participate in a variety of sports activities both inside and outside of school. Coaches should allow time for other activities, especially of a social nature, create fun and motivating atmosphere and delay specialized training. For their part, parents have an interest in monitoring their children's psychological state, provide opportunities for unstructured play and, of course, not exert undue pressure on them.

5. PROMOTING YOUTH SPORT AND PHYSICAL ACTIVITY

Given its proven beneficial effects, frequent and continuous participation in sports and physical activities must be promoted among young people. This is a responsibility that must be taken up by all concerned: parents, teachers, health professionals, elected representatives and those responsible for academic, sports and public health programs. Their efforts will be all the more effective if they reflect a theoretical model like the one outlined in Chapter 3. Measures to promote a physically active lifestyle that are based on ecological models are recognized as being more effective,²⁹⁷ since they make it possible to define target groups and the determinants that should be given priority.

The following sections will deal with how schools, sports and recreational organizations, the health system, municipalities, private business and families can help encourage youth to be physically active.

5.1 SCHOOL

As the numbers of sedentary and obese youth rise, schools appear to be the ideal place to take action. In order to optimize the schools' impact and capture the interest of school staff, it is important to incorporate physical activities into other projects^{90, 201} (such those that focus on healthy eating or violence prevention in the schoolyard). Among other things, this would make

it possible to use resources efficiently, so that staff members are not overextended. This could be done by establishing a common objective and an overall approach that takes into account psychological, social and environmental factors.²⁹²

Moreover, given the increasingly large number of children who spend a great deal of time in daycare centres, it is crucial that staff have the skills needed to help them develop their basic motor skills.

Physical and health education program and classes

The purpose of the Physical Education and Health program is to help students from Elementary 1 to Elementary 5 perform movement skills and interact with others in different physical activity settings and to adopt a healthy, active lifestyle.^o

To achieve this goal, the program involves a variety of activities geared to students' development level (i.e. introductory activities in elementary school and sports in secondary school). In addition, students are encouraged to examine the health effects of their sedentary activities, to draw up a plan for becoming more active, to carry it out over a given period and to then assess what they have accomplished. This approach teaches them about self-management, which is an important factor in adopting and maintaining a healthy lifestyle.³⁹ By giving students the tools they need to maintain a physically active lifestyle outside of school, the program goes well beyond the educational aspect which, while necessary, is generally insufficient to bring about behavioural change.³⁹

Although not an explicit goal of the Québec Physical Education and Health program, improving the physical condition of young people is crucial, given that too few of them get enough exercise in their free time.

In Québec, physical education and health classes have been compulsory since 2006. According to the basic school regulation set by the Ministère de l'Éducation, du Loisir et du Sport, a minimum of two hours per week should be devoted to physical education and health in elementary school, 100 hours per year in Secondary Cycle One and 50 hours per year in Secondary Cycle Two.¹³¹

Schools and governing boards are responsible for complying with the government's

^o Given that a lifestyle cannot be considered healthy if it does not involve physical activity, the expression "healthy, active lifestyle" may seem somewhat strange. However, it underscores the importance of physical exercise as part of a healthy lifestyle, in the same way that the expression "sport and physical activity" underscores the importance of sport, even though a sport is, by definition, a form of physical activity.

provisions.¹³⁰ Ideally, enough time should be allocated to these classes to help young people maintain and improve their physical fitness level.^{p 320}

Health education is aimed primarily at preventing chronic disease by dealing with topics such as nutrition, physical activity, sedentary lifestyle and smoking. Physical education and health courses could consist of an informational component and a behavioural component that, for example, involves role-playing games and advice on how to overcome obstacles to participation in sports and physical activities. These classes make young people more knowledgeable about their health and physical exercise, give them greater self-efficacy and help them reduce the amount of time they spend on sedentary activities. In theory, these changes should lead to an increase in the level of physical activity, but this is not always the case.^{49, 167}

Physical education and health classes are also intended to develop and maintain a positive attitude toward physical activity. This inclination, which is usually widespread among children, tends to decline during adolescence along with the number of hours of compulsory physical education instruction. However, according to literature review by Trudeau and Shephard,³²⁰ a sound physical education and health program can help to sustain interest in physical activity. It seems that courses that focus on skill development play a major role in this regard. Competitive activities should not be overlooked since they can be a source of motivation for many students.

In short, physical education classes are an excellent opportunity to increase the level of participation in moderate or vigorous physical activity.^{49, 299} Achieving this goal might involve:

- increasing the number of classes per week (the ideal being at least one class a day) or extending class duration
- maximizing the amount of time that students are physically active:
 - by taking attendance during exercise periods
 - by altering the format of the activities taught or the rules of games and sports so that more students can take part at the same time
- increasing the intensity of these activities

Facilities

Another simple and inexpensive way of encouraging participation in physical activity at school is to use playground markings for such games as hopscotch, or

^p With a greater emphasis on health, the challenge is to cover the subject matter without reducing the amount of time during which students are active.

outlines of such things as pirate ships and games of snakes-and-ladders, which appeal to children's imagination.^{270, 293} Furthermore, according to experiments carried out in Québec, having playground equipment seems to help reduce schoolyard violence.^{199, 314} However, it is important to ensure that this equipment does not take up too much space in the schoolyard so that there is enough room for team games. If other sports facilities and equipment are located close to the school, agreements could be reached with their owners to enable students to use them during physical education classes, during recess and after classes.

Activities during free time

According to a review of the literature, physical activities carried out at school during free time (recess, lunch hour) enable children to accumulate 36 minutes of moderate or vigorous physical exercise per day.²⁵⁴ Another way to promote participation in physical activity throughout the day is to encourage it during recess, during the lunch hour and after school.¹⁵⁶ For example, games that students can try out in the schoolyard^q could be taught during physical education classes or regular classes.²⁷⁰ It is also important that students have access to facilities and equipment, for example, by setting up an area where they can borrow equipment during recess and lunch hour.³³⁷ Another interesting possibility is to have young people participate in choosing and managing activities.

Extracurricular activities

Extracurricular activities in or outside of school help increase the overall level of physical activity.²³⁷ By offering a variety of sports and physical activities, schools can meet two basic needs of young people: having fun and spending time with their friends. Parents may also be reassured if these activities are carried out in a safe setting.²³⁷ In order for young people to be able to participate regardless of their socioeconomic status, the activities should be accessible both in terms of cost and transportation. For example, students who live far from the venue for a given activity should be provided with a means of transportation that enables them to get back home safely.

Encadré

Model experiment

At the Pavillon Wilbrod-Dufour secondary school in Alma, the timetable was

^q In the *Ma cour : un mode de plaisir* information kit, Kino-Québec provides advice on how to set up the schoolyard to optimize its use, suggests a variety of games and emphasizes the importance of ensuring that students have access to equipment before, during and after school.

organized so that students could participate in sports and physical activities without having to get to school earlier or leave school later. Classes were offered in outdoor activities, football, volleyball, swimming, cheerleading, hip-hop, ballet and a Sport-Études^r program in hockey. This great variety of activities is possible because an agreement has been reached with the city which provides students with ready access to nearby facilities.

Fin de l'encadré

Active transportation

Young people who use active transportation (walking, cycling) to get to and from school are generally more active than those who travel by car,⁷⁹ which suggests that the latter do not make up for these periods of inactivity by doing more exercise in their free time. Active transportation to and from school therefore accounts for a significant part of daily energy expenditure.

A perceived or real lack of safety is one of the main reasons parents give for not allowing their children to walk or cycle to school. Elementary schools, in cooperation with parents and other partners (e.g. municipalities, non-profit sports organizations), can draw inspiration from Vélo Québec's *On the move to school!* program to encourage active transportation¹⁴³ by reorganizing urban infrastructure, reducing the traffic, setting up bicycle racks, and implementing *Trottibus* or *Pedibus* programs.^s These programs also foster social interaction and create a healthy, safe and non-polluting alternative to motorized transportation.

Schools can take other measures to encourage students to opt for active transportation.²⁵⁹ These include:

- organizing weekly walking or cycling activities between classes
- offering training on bicycle safety and maintenance
- having young people help organize an awareness campaign (especially recommended for secondary-school students, this activity can also be carried out together with college or university students)
- extending the bussing eligibility distance^t and setting up a safe drop-off area for school buses

^r Not to be confused with extracurricular sports or with sport-specific programs, Sport-études is intended only for students whose athletic talent has been confirmed according to the standards set out by each Québec sport federation concerned.

^s Like the Canadian Cancer Society's walking school bus (Trottibus) program, the Pedibus program involves having adults (e.g. volunteers, senior citizens) and older students (e.g. grade 6 students) accompany groups of elementary school students as they walk to and from school.

^t While it is 5 km in Finland, it is usually less than 2 km in Québec.

- working with the municipality to create school corridors for pedestrians and cyclists
- provide students and their parents with information on the measures taken to improve safety around school premises

Action

In addition to ensuring that children can safely walk or cycle to and from school and that parents are kept informed of the measures taken by the school in this regard, education stakeholders^u must make sure that students have as many opportunities as possible to do physical exercise, particularly through:

- physical education classes held every day
- diversified programs for extramural and intramural sports that focus on enjoyment and motor skill development, with a view to acquiring healthy lifestyle habits
- organized recreational activities
- periods of physical activity during lunch hour and after school
- youth physical activity leaders with the required skills
- schoolyards set up to encourage safe participation in sports and physical activities
- training and support for young leaders who could be in charge of organizing and conducting certain activities
- parental participation in organizing activities

In addition to promoting regular participation in sports and physical activities along with other healthy lifestyle habits, it is necessary to:

- increase dialogue with municipalities, community centres and sports organizations in order to optimize the use of sports facilities and equipment
- open the school and its facilities outside school hours
- facilitate after-school transportation in order to allow a greater number of young people to take part in extracurricular activities
- reach agreements with school daycare centres in order to foster optimal use of the equipment and facilities
- make sure that future investments take into account young people's changing preferences⁸⁹

^u Governing board members, school board administrators, school principals, those in charge of sports and recreational programs and facilities in elementary and secondary schools.

5.2 SPORTS AND RECREATION ORGANIZATIONS

As we have seen, because needs and motivational factors vary from one young person to the next, it is as important to offer introductory and recreational activities as it is to offer activities that focus on competition and excellence. In short, none of the facets of sport participation should be neglected. It should be remembered that the Québec sports community has defined the components of sport participation and highlighted its main supporting factors, namely continuity of play and performance, rules of the game, organization and technical content, ability and motivation, playing time and training time.^{133, 298} Québec sports federations have integrated these components into their sport participation development plans.²¹²

To guarantee the quality of the support and supervision that young people will receive, it is important to ensure that coaches, activity leaders, and others involved in organizing sports and physical activities are competent and properly trained. However, in Québec, like elsewhere in Canada:

- it is difficult to motivate these people to take training courses and to upgrade their skills
- the dropout or turnover rate among coaches is high
- the shortage of referees and judges and their high dropout rate—25 to 30% per year—hamper the development and quality of sports, especially in secondary school¹

Few studies have been conducted on the role that sports and recreational organizations can play in increasing youth physical activity.²⁴² In Québec, where one person in ten is a member of a sports federation (the majority of whom are young people), these organizations could play an important role with respect to public health.

Action

Québec sports and active recreation organizations, whether provincial, regional or local, must offer physical, sport and outdoor activity programs that are as varied as possible and that reflect the preferences and schedules of children and adolescents, as well as the financial resources of families. It would be useful if these organizations could organize promotional campaigns aimed at youth regardless of their skill level, even if it means adapting the rules of different sports

to make them easier to play.

Encadré

Measures taken by sports federations

A study conducted in 2006-2007 by the Ministère de l'Éducation, du Loisir et du Sport showed the value of measures taken by sports federations, such as the *Smart Tennis* program of the Fédération québécoise de tennis, which introduces children aged 5 to 10 to tennis.⁸³ However valuable these measures may be, the study found that they are insufficiently promoted, since many federations devote their resources to competitions and the development of high-level athletes.

Fin de l'encadré

By working together with schools and the municipal services concerned, these organizations can support sports training activities without neglecting introductory and recreational activities. Organizations should make sure that those in charge of introductory, training or other activities have the required skills to make this experience enjoyable, thus fostering young people's continued participation. As much as possible, the fees for such services should take into account the financial means of families. If it is feasible, organizations should consult young people about their needs and ask them to take part in designing services.

In addition to organizing training sessions in which exercises take the form of games, coaches and activity leaders could:

- organize sessions that offer a variety of activities, challenges and opportunities for all participants to shine, including those who do not necessarily have much aptitude or skill
- avoid early specialization if it is not necessary
- make it possible for young people to participate in organizing activities
- value effort, determination and improvement, not just success and winning
- combine social and sports activities to foster socialization

The support of coaches is crucial to the development of personal and social skills.⁷⁴ In addition to promoting the development of physical and mental abilities, coaches can do the same with regard to sports values¹¹⁷ by:

- requiring that their organization adheres to the *Avis sur l'éthique en loisir et en sport*^v

^v See www.mels.gouv.qc.ca

- participating in sports education and ethics programs (e.g. *Programme 3 R* of the Réseau du sport étudiant du Québec)
- organizing information and awareness workshops
- leading group discussions^{119, 216}
- making reference to the exemplary conduct of elite athletes admired by young people

Lastly, activity leaders should never weigh young people or measure their waist size or body composition in front of their peers, or make comments about their weight. This information is confidential and should be used to refer young people and their parents to health professionals.

5.3 THE HEALTH CARE COMMUNITY

According to a recent literature review, physical activity programs delivered in health care settings show promise among adolescents.²⁷⁰ Young people need not be sick to receive advice on healthy lifestyle habits, particularly frequent participation in sports and physical activities.

Below are examples of interesting programs that have been implemented in the health care system.

- counselling programs with specialists (e.g. physicians, pediatricians, nurses) who provide youth or their parents with literature on the importance of physical exercise, or on ways to increase their level of physical activity (e.g. setting goals, drawing up action plans, coming up with tricks to overcome barriers)
- follow-up programs conducted by telephone, mail or email
- individualized, computer-designed physical activity programs that are then approved by a physician

Once individualized physical activity programs are offered to youth on a large scale, it is important that health care workers know about them so that they can direct young people to these new resources.

Action

Physicians could:

- ask young patients (or their parents) about their participation in sports and

physical activities

- advise parents to motivate their children to regularly participate in sports and physical activities (Table 7)
- make adolescents, particularly those who are overweight and who have a family history of cardiovascular disease, aware of the importance of adopting and maintaining healthy lifestyle habits such as regular participation in sports and physical activities
- get involved in the community (on governing boards, in parent associations or citizens' committees) to argue in favour of adopting means of facilitating youth physical activity

Professionals involved in public health promotion programs should focus some of their efforts on fostering active living among youth. Physical activity professionals could identify, and even design, games and other forms of physical activity that are most appropriate for children and adolescents.

Health professionals specialized in weight control programs should:

- design personalized programs for obese youth, based on an evaluation of their physical fitness and lifestyle habits. Such programs should include:
 - basic information on health
 - the promotion of a physically active lifestyle that includes walking and cycling as a means of transportation, as well as a varied and healthy diet that is low in calories
 - long-term goals concerning changes in lifestyle habits and weight loss
 - cognitive and behavioural intervention techniques to foster the acquisition of self-management skills (e.g. problem solving, positive self-image)
 - information on the availability and accessibility of sports facilities as well as existing sports associations and services
 - supervision and follow-up by a physical activity professional

5.4 MUNICIPALITIES

As we saw earlier, because physical activity participation in youth is influenced by the physical environment as well as by individual and social factors,^{18, 106, 122, 186, 252} it necessary to take action on the built environment and land use and to examine possibilities for non-motorized and public transportation.

Action

In order to promote the development of physical environments and regulatory frameworks that are conducive to youth sport and physical activity, municipal and transportation officials could:

- undertake the *Municipalité active*^w initiative proposed by Kino-Québec in partnership with regional sports and recreation offices, the Association québécoise du loisir municipal and the Institut national de santé publique du Québec
- increase residential density while making sure that the quality of the living environment is maintained
- develop and maintain cycling and walking paths
- provide well-lit bicycle parking accessible from the street and located close to building entrances or parks; provide a sufficient number of racks to which users can lock their bikes
- design roads and new neighbourhoods to promote safe non-motorized transportation
- promote mixed land use and proximity of services so that young people can easily and safely walk or cycle for utilitarian purposes
- provide adequate public transportation
- offer free or affordable transportation to activity facilities
- ensure that areas where sports and physical activities are carried out, notably in and around city parks, are safe
- offer all citizens access (free of charge, if possible) to sports and recreational facilities, equipment and services that are located close to their homes and that are easily accessible on foot and by bicycle
- adopt regulations governing fees to make it easier for youth and families to have access to sports and physical activities^x
- avoid centralizing facilities and equipment
- support volunteerism in sports and physical activities
- promote “blue, green and white spaces” (i.e. bodies water, parks for summer and winter activities)
- develop high-quality public spaces that can be used for various sports and

^w See www.kino-quebec.qc.ca/municipaliteActive.asp.

^x For example, in Québec City, the population can use skating rinks and public swimming pools free of charge. In Granby, measures have been taken to enable families with two or more children to save on registration fees for each person.

physical activities

- allow traffic to be rerouted when popular sport and physical activity events are held (e.g. temporary and festive inline skating path)
- help solve social problems that affect youth by promoting sports and physical activities

5.5 PRIVATE BUSINESSES

Even though the primary goal of businesses is to make a profit, policies, programs and measures could be adopted to encourage the business community to take part in promoting youth sport and physical activity.

Action

In particular, businesses could:

- sponsor sports and recreational organizations and activities
- offer reduced rates to children and adolescents
- reach agreements with schools and non-profit sports organizations to share facilities or equipment, and offer them services that meet their needs
- host open house events for young people, families and schools
- take part in talent scouting programs
- host groups as part of sports internships, Sport-études programs, etc.

5.6 FAMILY

Various programs have been created to prompt parents to encourage their children to be physically active: information sessions, goal setting, problem solving, family behaviour management, physical activities for families, etc. Since few studies have focused on these programs, it is impossible to assess their effectiveness among children and adolescents.^{270,299,335} Meeting with parents to provide them with training or advice appears to be a promising approach.²²⁹ There is no doubt that parental participation contributes to the success of school programs.^{270, 292, 335}

According to a recent Québec study, active transportation between home and school is not a major concern among parents.⁹⁴ Parents who feel their neighbourhood is unsafe for walking and cycling tend to restrict opportunities for

children to get around on their own.^{156, 310} Such restrictions, along with limited play areas or the disapproval of outdoor play, are barriers to participation in sport and physical activity.²²¹ In strict families, children of preschool age tend to be less active than children whose families place fewer restrictions on them.³⁰⁷ Conversely, having a certain amount of freedom and being able to explore local surroundings is conducive to active transportation and contributes to the development of children's autonomy.

Thus, the promotion of non-motorized transportation should always include components for parents in order to help them change their perception of danger, if it is unrealistic, or to inform them of the means implemented to provide safer school corridors, parks, playing fields, etc.

Action

In addition to setting an example by doing physical exercise as a family, there are a number of ways parents can encourage their children to participate in sports and physical activities. Of course, in this regard, we must take a number of factors into account: available income, type of residence, neighbourhood, number of children in the family, incompatibility of work schedules with children's free time, and so on. If possible, parents could:

- provide their children early on with opportunities to learn and practise basic motor skills (sidebar p. *)
- introduce their children at an early age to activities they can engage in all their lives, especially those that are suited to our geography (swimming, hiking), climate and culture (skating and ice hockey, ringuette, cross-country skiing, alpine skiing, snowboarding)
- enroll children in municipal, school or private sports and physical activity programs that follow, as much as possible, the recommendations listed in Table 7
- accompany their children to practices and competitions to show their support
- get involved in sports organizations and help out with transportation and supervision
- organize areas in and around the home where children can play or do sports
- provide the necessary equipment and material so that their children can be active in their free time, particularly after school and on weekends
- make sure that daycare services offer numerous opportunities for jumping, running, climbing, throwing, catching, etc., in a safe and playful environment

It should be remembered that young people generally prefer outdoor activities that are easily accessible and diversified, that they can engage in as long as they want and, above all, that they find enjoyable.

To demonstrate the importance they place on frequent, uninterrupted practice of sport and physical activity, parents can:

- influence their children in the three most effective ways, namely by encouraging their children's participation in physical activity, facilitating it and participating in it themselves
- help their children plan how they will occupy their time so that they participate in sports and physical activities on a daily basis, making sure not to present these activities as an obligation or a punishment
- promote active and public transportation by explaining these concepts to their children and insisting on safety rules
- avoid placing unnecessary restrictions on their children's ability to get around on their own by limiting the places where they can play or by disapproving of outdoor play
- be proud of their children, regardless of how they perform, and avoid putting pressure on them to achieve results; the important thing is to recognize progress and not harp on mistakes or defeats
- encourage their children to have a positive attitude toward their participation in sport and their achievements
- ensure that their children can take part in spontaneous and unorganized sports and physical activities; this could involve teaching them to how to get organized on their own or in a group
- petition the authorities to provide access to sports facilities and equipment, to improve safety on the roads and in parks and to design sports and recreational programs geared to the needs of today's youth and families

Parents could adhere to the parents' code of ethics proposed by the Ministère de l'Éducation, du Loisir et du Sport^y and promote values that are traditionally associated with sport. Listed below are tips for developing and enriching their children's knowledge of sports:

- take them to see amateur or professional sports events
- explain the main rules and history of the sports they might play
- talk to them about Québec's top athletes who could serve as role models

^y See www.mels.gouv.qc.ca

Parents should encourage girls as much as they do boys. With adolescent girls, it may be necessary to emphasize positive aspects of physical exercise that are not necessarily tied to aesthetics, namely: fun, general well-being, increased energy, self-esteem, opportunities for making new friends, etc.

In the case of children who are not active or who are overweight, in addition to applying the above-mentioned recommendations, it would be a good idea to keep in mind that motivation is based more on enjoyment than on the desire to be healthy. Remember that a healthy weight depends on maintaining a balance between energy expenditure and energy intake, which makes it important to do a sufficient amount of exercise.

5.7 SOCIAL CAMPAIGNS

Although usually costly, social campaigns are ideal for reaching large segments of the population. Intended for the general public, these campaigns make it possible to convey messages to target populations. While the effect of social campaigns on behaviour is more difficult to gauge, they reach many people and can influence beliefs, attitudes and social norms, which are factors that determine whether youth adopt a physically active lifestyle.

Social marketing is a promising form of social campaigning. This approach, which focuses on a target population, involves applying marketing concepts to health issues. Once a problem has been identified, a field study should be conducted to define the attitudes, values, behaviours, benefits and barriers that the target population associates with the desired behaviour. According to Marie-Ève Lang,¹⁸¹ for example, field studies have shown that social marketing campaigns aimed at adolescents should focus on:

- social aspects (making new friends, being accepted)
- enjoyment (avoiding boredom, regaining energy)
- control over choices and activities
- self-confidence
- creativity
- expertise (learning to master new skills)

A field study can also be used to validate messages, to choose tools, programs and media vehicles, and to ensure that the messages are well received by the target population.

With the information collected, the campaign's effectiveness can then be optimized by following the basic rules of business marketing (i.e. the 4 Ps), namely:

1. **Product:** The focus is on the behaviour to be modified and the beneficial effects of such change (e.g. participating in physical activity provides enjoyment).
2. **Price:** The focus is on the costs (financial, psychological, time-related) or the barriers that a person associates with certain behaviour.
3. **Place:** The focus is on where and when a person can exhibit the desired behaviour, enroll in a program or think about the effects of this behaviour on his or her health.
4. **Promotion:** The focus is on all the means used to reach the target population and educate it about the behaviour to be adopted, its costs and the feasibility of making such a change.

Social marketing campaigns therefore focus on a "product," its beneficial effects and access at a low cost.

5.8 SOCIAL MEDIA AND COMPUTER TAILORING

Thanks to new information technologies, social media enable young people to create social networks (through blogs, forums, personal pages, texting).²⁴⁶ Of course, time devoted to social media appears to be time taken away from sports and physical activities, but young people use these technologies mostly to plan their next outings²⁴⁶ so it would be useful to examine how Web sites, Facebook, Twitter, YouTube and blogs can be used to promote sports and physical activities.²⁹

According to a recent literature review,²⁷⁰ it would seem that computer tailoring and behaviour modification programs based on a behavioural approach show promise in reaching adolescents. This involves offering personalized physical activity programs via the Internet or applications for smartphones and tablets. Since these programs are adapted to each individual's needs, motivations and perceived barriers, they are more likely to elicit behavioural changes than mass campaigns with a single message.²⁹ According to a number of research reports, this approach is very encouraging.²⁹

5.9 MOBILIZING PARTNERS

The community and current and potential partners must be convinced that it is possible to improve the situation; to succeed in doing so, it is crucial that all do their part and work together.²⁴⁷

As Québec en Forme points out in its *Cadre de référence - Mobilisation d'une communauté locale*, community mobilization is based on the following principles:²⁴⁷

- solid, stable and collaborative leadership: competent and recognized leaders oversee efforts, ensure their consistency, foster dialogue and manage processes
- a common and shared vision: stakeholders share a vision, are committed to it and communicate it. They want to meet real needs based on in-depth knowledge of the issues and situation.
- intersectoral action: the different community sectors and networks are committed to an action-based collaborative approach. Together they strengthen the social capital and the ability to take action.
- effective governance (structure and functioning): the leadership involved can take different forms provided it is legitimate, complementary, flexible, inclusive, democratic and geared to strategic action
- assessment and renewal of mobilization efforts: mobilization efforts must be renewed and adapted to changing contexts. Together, the stakeholders define the evaluation mechanisms in order to measure changes and assess the processes that made these changes possible and to document what has been learned
- various levels and types of partnerships: this involves strengthening mobilization efforts and implementing joint action plans

These principles could likewise be used to mobilize partners at the provincial level. Media advocacy,³⁴³ which is commonly used to promote a cause, should also be considered. Advocacy includes a set of measures taken to influence public opinion, government and policies, so that all young people can regularly participate in sports and physical activities, value this kind of lifestyle and appreciate its benefits. This means enlisting the help of credible and committed people who share the same vision and communicate an appropriate message.

Encadré

The Toronto Charter

The *Toronto Charter for Physical Activity: A Global Call for Action*¹²⁴ calls for concerted action across four key areas. These four action areas are distinct, yet complementary, building blocks for successful population change.

1. Implement a national policy and action plan
2. Introduce policies that support physical activity
3. Reorient services and funding to prioritize physical activity
4. Develop partnerships for action

To be effective, this action should involve governments, civil society, educational institutions, professional associations, the private sector, organizations inside and outside the health sector as well as communities.

Fin de l'encadré

5.10 EVALUATION OF POLICIES, PROGRAMS AND MEASURES

The need to rigorously evaluate the policies, programs and measures aimed at promoting regular participation in sports and physical activities cannot be overstated. Even if there are models and theories backing up the measures to be taken, the fact remains that not all possible strategies have been assessed or applied, which is why it is important to fully examine the strengths and weaknesses of action taken.

Thus, as often as possible, youth physical activity levels should be measured before, during and after a measure has been implemented. In addition, every element that may contribute to a measure's success or failure must be examined, in particular:

- the population segment targeted
- the objectives
- the methods of promotion
- the leadership of those in charge
- the relationship with partners and their degree of involvement
- logistics
- budget management

Lastly, the results of these efforts must be disseminated, best practices must be publicized and, where necessary, relevant theories and models must be refined or new ones developed.

CONCLUSION

The fact that too many young people are not active enough has become a cause of great concern, and rightly so.¹⁰⁰ As a spontaneous form of entertainment and a source of well-being, sports and physical activities:

- help improve and maintain all physical fitness determinants as well as several components of physical and mental health
- contribute to educational success
- go hand in hand with other healthy lifestyle habits

In addition, they can help foster a feeling of belonging to the community and create social networks.

It is therefore important that all stakeholders work together to offer young people attractive opportunities for physical exercise. Fortunately, Quebecers have a strong will to take action. To ensure that this willingness translates into action and yields desired outcomes, stakeholders must not only work together with young people but also act on their physical and social environment.

We should focus not only on physiological, logistical and environmental considerations, but also ask ourselves what role sports and physical activities should play in the lives of tomorrow's adults. Do we want a society in which people meet their physical exercise needs as if they were taking a food supplement? Extreme or virtual types of physical activity such as rigorous prepubertal training, weight training with equipment at a young age and physically active video games can certainly have significant biological effects. However, would it not be better to live in a society in which all children and adolescents discover the pleasure of sport and physical activity in their everyday lives?

In short, it is essential that all stakeholders make an effort to encourage youth to participate in sports and physical activities on a regular basis. This is not only a public health issue, but a major social issue as well.

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APPENDIX I – TERMINOLOGICAL CLARIFICATIONS

Sport and physical activity: The expression “sport and physical activity” used in this brief can seem a bit redundant in the sense that, by definition, a sport is a physical activity. In the strict sense of the word, “physical activity” is *any form of bodily movement that utilizes the body’s physical resources to perform movements*,¹⁸⁸ which obviously includes sports. However, in the language used in this field in Québec, “physical activity” refers specifically to *any recreational and utilitarian activity* (e.g. active transportation) *that calls upon the body’s physical resources to an extent sufficient enough to have a positive effect on health*. Thus, for many people and in many contexts, the concept of physical activity does not automatically include sports.

Furthermore, sports can be a large part of youth physical activity. This is why we prefer the expression “sport and physical activity” to refer to the types of activities that are often discussed in this document.

Sport: In this document, “sport” refers to both organized and non-organized sports.

Sufficiently active: Young people who accumulate at least seven hours a week of moderate and vigorous physical activity are described by some researchers as being “sufficiently active.” This would indicate that there is a threshold of physical activity below which there are no health benefits and above which there are, which is not accurate. Some physical activity is better than none, and more is always better (except, of course, in extreme, very rare cases).^{62, 328}

APPENDIX II – NEW WAYS TO PROMOTE SPORTS AND PHYSICAL ACTIVITIES

Healthy Schools program

www.mels.gouv.qc.ca/dfgj/csc/promotion/ecoleensante.html

- **“Québec, on aime la vie:” campaign to promote healthy lifestyle habits**
www.saineshabitudesdevie.gouv.qc.ca
- **Fonds pour le développement du sport et de l’activité physique**
www.mels.gouv.qc.ca/sections/fondsDeveloppement
- **Grand défi Pierre Lavoie (event promoting health)**
www.legdpl.com/en/
- **En forme avec Myg et Gym**
<http://enforme.rseq.ca>
- **ISO-ACTIF**
www.arser.qc.ca/programmes/iso_actif.shtml
- **Québec Sports and Physical Activity Day**
www.mels.gouv.qc.ca/jnsap/index_en.asp
- **On the move to school!**
http://www.velo.qc.ca/monecole/index_e.php
- **Plan d’action gouvernemental de promotion des saines habitudes de vie et de prévention des problèmes reliés au poids 2006-2012 – Investir pour l’avenir**
www.saineshabitudesdevie.gouv.qc.ca/extranet/pag
- **Going the Healthy Route at School – Framework Policy on Healthy Eating and Active Living**
http://www.mels.gouv.qc.ca/sections/viragesante/index_en.asp
- **Bicycle Policy**
http://www.mtq.gouv.qc.ca/portal/page/portal/Librairie/Publications/en/amenagements_cyclables/pol_velo_en2008.pdf

- **Physical Education and Health Program**
http://www.mels.gouv.qc.ca/dgfj/dp/programme_de_formation/primaire/pdf/educprg2001/educprg2001-091.pdf
http://www.mels.gouv.qc.ca/DGFJ/dp/programme_de_formation/secondaire/pdf/qep2004/chapter91.pdf
http://www.mels.gouv.qc.ca/sections/programmeFormation/secondaire2/medias/en/9b_QEP_EducPhys.pdf
- **Québec National Health Program 2003 - 2012**
<http://msssa4.msss.gouv.qc.ca/en/document/publication.nsf/ff52dbec0b2ed788852566de004c8584/18bad42cc1a754e98525753c00650c3b?OpenDocument>
- **New Kino-Québec programs**
 - **Ma cour: un monde de plaisir!**
www.kino-quebec.qc.ca
 - **Municipalité active**
www.kino-quebec.qc.ca/municipaliteActive.asp
 - **Winter Fun**
http://www.mels.gouv.qc.ca/plaisirshiver/index_en.asp
 - **Concours École active**
www.mels.gouv.qc.ca/rva
- **Québec en Forme**
www.quebecenforme.org
- **“Jouez gagnant” component of the Équipe Québec program**
www.mels.gouv.qc.ca/loisirsport/equipequebec/index.asp?page=jouezgagnant

APPENDIX III – SHORTCOMINGS OF THE CURRENT GUIDELINES

Most guidelines, and our interpretation of them, are usually characterized by the following shortcomings:

- Current guidelines focus almost exclusively on the effects of exercise on physical health, whereas:
 - Regular and continuous participation in sports and physical activities has other beneficial effects, particularly on mental health. It is also associated with several determinants such as socialization, student retention and healthy lifestyle habits. The most appropriate types of activities and the conditions under which they are carried out are sometimes different from those recommended when only physical health is considered.
 - The incidence of physical health problems that can be prevented or treated with exercise is lower (although increasing) among young people than among adults.
 - Most of the physical health benefits of activities carried out during childhood and adolescence do not necessarily persist into adulthood if physical activity is discontinued.
- They current guidelines consider sports and physical activities as a whole even though not all activities have the same impact on physical fitness determinants and various aspects of health. This is a serious shortcoming. For example, only weight-bearing activities improve bone strength,⁶⁵ and one hour of soccer or cross-country skiing burns more calories than one hour of football or badminton.^{62, 347}
- They overlook the fact that young people naturally tend to engage in intermittent activities and often dislike prolonged activity with little change in intensity.
- They propose a daily or weekly amount of physical activity that is clearly arbitrary and often overlooks individual differences. This could give the impression that:
 - the recommended level of physical activity is backed up by conclusive data
 - there is no advantage to doing more physical activity than the recommended amount
 - there is no point in engaging in physical activity if it is less than the recommended amount

- However, according to current information on the dose-response relationship between physical activity (type, duration, intensity, frequency, etc.) and each aspect of physical and mental health in both youth and adults, it is better to do a little physical activity than none at all, but doing more is always better (except in extreme, very rare cases).^{154, 159, 308} In addition, nothing indicates that there is minimum threshold of physical activity that could be described as “sufficient.”
- They disregard a well-documented principle which holds that there are windows of opportunity for developing certain motor, physical or behavioural skills. For example, it is easier and better to develop motor skills and bone strength before puberty, just as it is preferable to wait for young people to reach a certain level of psychological maturity before trying to convince them that physical activity is good for their health.
- They do not sufficiently emphasize the importance of providing young people with opportunities for satisfying sport-related experiences that could encourage young people to maintain a physically active lifestyle.
- They do not take into account specific historical, cultural and geographical factors. For example, given Québec’s northern location and numerous bodies of water and the importance of certain sports in its history and culture, should we not expect the guidelines to emphasize winter, aquatic and nautical activities?
- They do not always consider the environmental determinants of youth physical activity such as the built, social, economic and political environment.
- They do not necessarily take into account the viewpoint of:
 - parents, who must devote time and money to help their children participate in sports and physical activities
 - educators, who can play a key role with respect to physical and academic education and awareness raising, but for whom promoting physical activity is one more challenge among so many others (e.g. the fight against bullying, substance abuse and dropping out of school)
- They do not take into account young people's level of physical activity, motivation, weight, and health status. Young people who are sedentary or who have health problems (e.g. uncontrolled asthma and high blood pressure) may find it too difficult to achieve the goal of doing 60 minutes of physical activity per day, while those who are already active may think this is not challenging enough.¹⁵⁹

- They usually do not specify that obese youth who need to lose weight and not gain it back must do more exercise than is usually recommended for youth of normal weight.¹⁵⁹
- They disregard the fact that physical fitness, like physical activity, is inversely related to morbidity, even among children.⁵

APPENDIX IV – SIX SEGMENTS OF ADOLESCENT GIRLS: PHYSICAL ACTIVITY INTERESTS AND POTENTIAL MARKETING STRATEGIES

Segment	Physical activity level and interest	How they would react to TAAG	Barriers to participating in physical activity	Channels for distributing messages	Influential information sources	Message
Athletic girls	<ul style="list-style-type: none"> - Recognize the importance of physical activity - Like and participate in all activities - Interests: basketball, football and soccer 	These girls will love TAAG	Lack of time	Not probed	<ul style="list-style-type: none"> - Physical education teachers - Coaches 	Themes promoting all types of activities and competition
Preppy girls	<ul style="list-style-type: none"> - Some are active to get in shape, others are not; others are active if it is social - Interests: basketball, cheerleading, dancing, Double Dutch, field hockey, football, gymnastics, ice skating, soccer, softball, stepping, aerobics, tennis, track and field, volleyball, walking 	<ul style="list-style-type: none"> - Probably would participate, especially if there is competition between schools and activities are social 	<ul style="list-style-type: none"> - Concerns about appearance - Concerns about injury - Concerns about time 	Not indicated	<ul style="list-style-type: none"> - Older cheerleaders or majorettes - Older preppy girls - Friends - Parents 	Themes that feature fashionable girls and social opportunities
Quiet girls	<ul style="list-style-type: none"> - May be active or inactive - They may not be involved in sports because they are uncomfortable with the attention - Interests: basketball, volleyball, individual sports, walking 	<ul style="list-style-type: none"> - Shy girls may not participate - Other girls might participate if they found an activity they liked 	<ul style="list-style-type: none"> - Shyness - Belief that they don't fit in 	Flyers	<ul style="list-style-type: none"> - Teachers - Friends 	Themes designed to emphasize comfort and ability to be active alone or in small groups of friends
Rebel girls	<ul style="list-style-type: none"> - Probably not interested in physical activity - Interests: biking, rollerblading, skateboarding 	Would not be interested	<ul style="list-style-type: none"> - Heat, because of their black clothing - Wanting to avoid doing something perceived as popular 	<ul style="list-style-type: none"> - Flyers (in school, stores, skate parks) - Punk music 	<ul style="list-style-type: none"> - Teachers - Friends - Parents - Counsellors 	Themes include messages that show you can be active without joining a team

Smart girls	<ul style="list-style-type: none"> - Like physical activity if it doesn't interfere with grades - They may prefer to read - Interests: basketball, softball, volleyball, walking 	<ul style="list-style-type: none"> - A focus on sports might turn them off - Social activities might interest them 	<ul style="list-style-type: none"> - Other kids' attitudes toward them - Fear of not doing well - Taking time away from school or homework 	Flyers	<ul style="list-style-type: none"> - Teachers - School counsellors - Friends 	Themes linking activity to achievement or as something important to the school
Tough girls	<ul style="list-style-type: none"> - In general, do not participate in physical activity - They are not interested unless it is a social scene - Interests: fighting, stepping*, street basketball 	Likely to get involved: <ul style="list-style-type: none"> - if there was a step or dance team - if they can do things their way 	None identified	Rap music	<ul style="list-style-type: none"> - Teachers and adults engaged in programs aimed at encouraging at-risk students to stay in school - Encouraging messages from boys 	Themes include choice, independence, setting one's own rules

TAAG: Trial of Activity for Adolescent Girls

* *Stepping*: a type of aerobics that involves using a low step

Source: Staten, et al. (2006)²⁸⁷